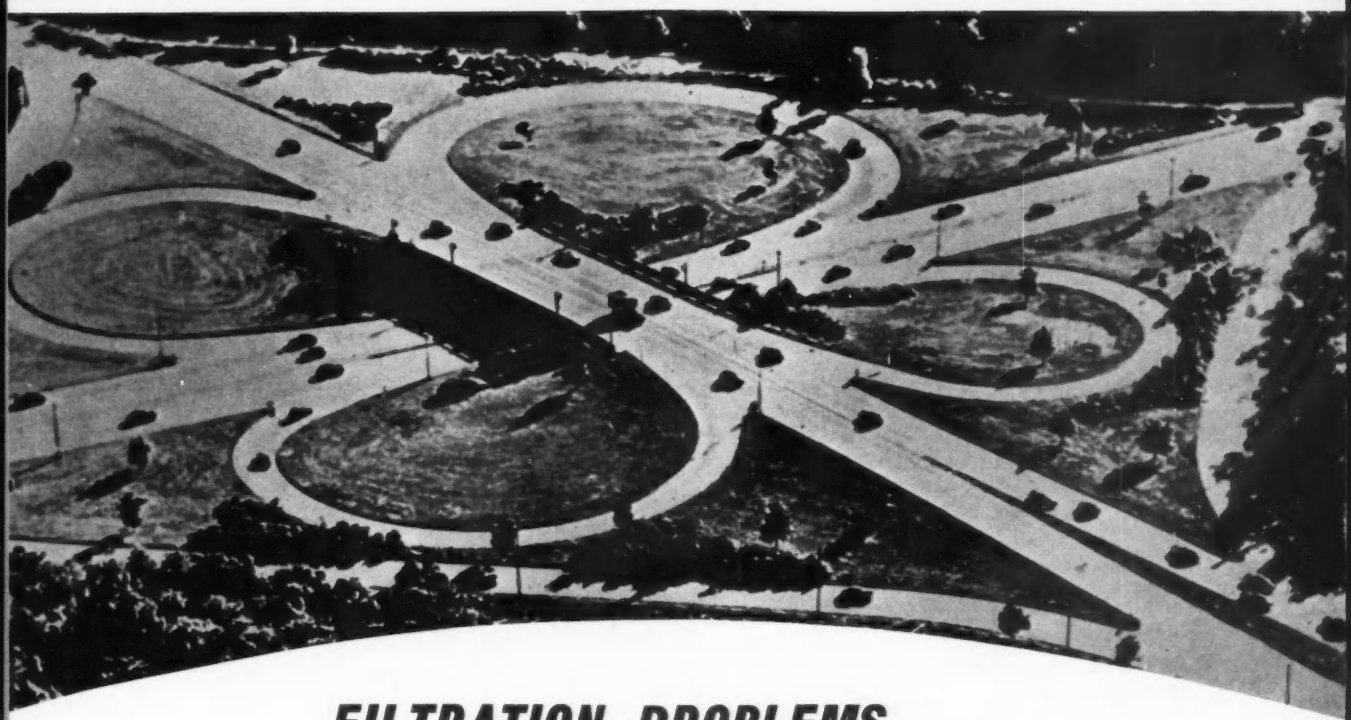
Chemical Age



INDEX TO ADVERTISERS

The first figures refer to advertisements in **Chemical Age Directory & Who's Who,** *the second to the current issue*

(continued on page 366)

INDEX TO ADVERTISERS

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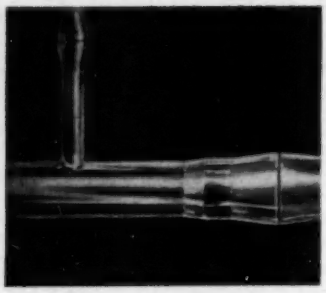

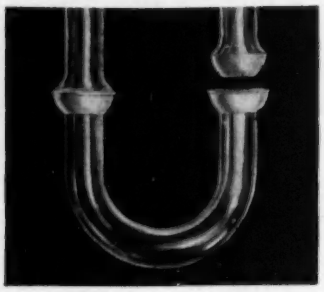

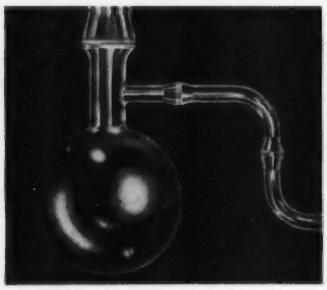

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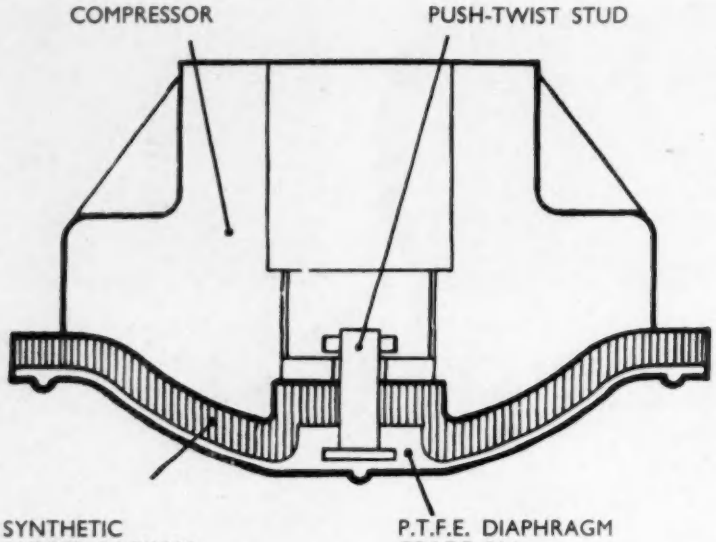

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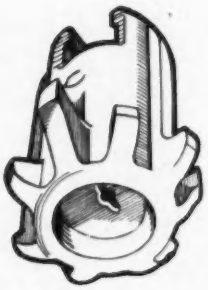

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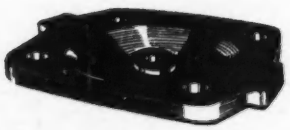

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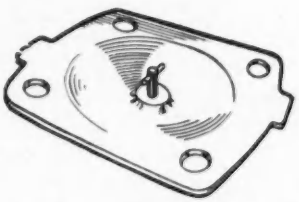

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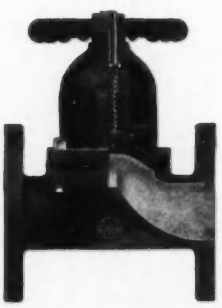

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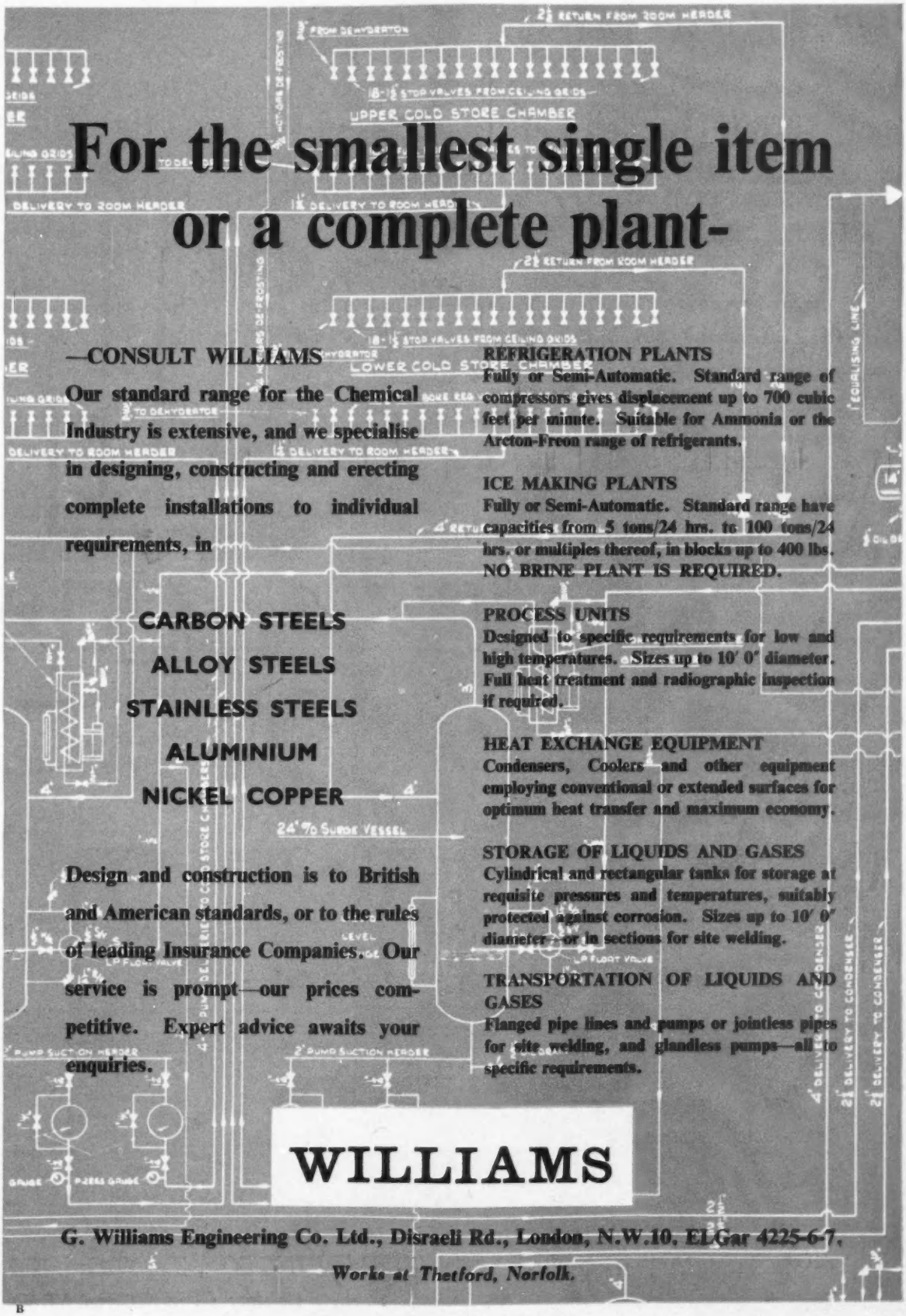

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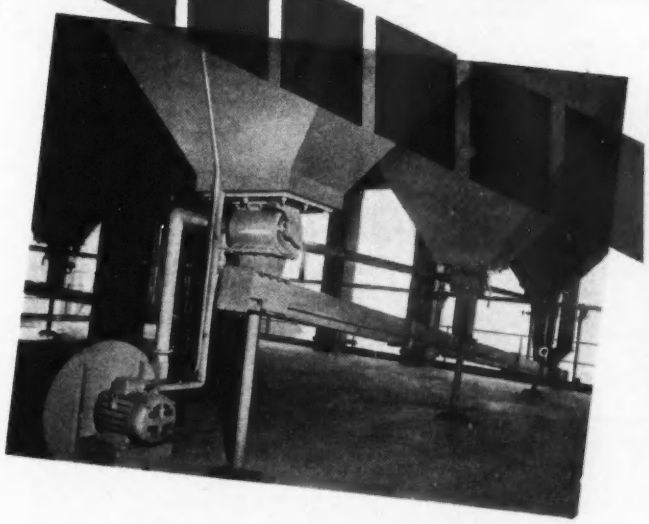

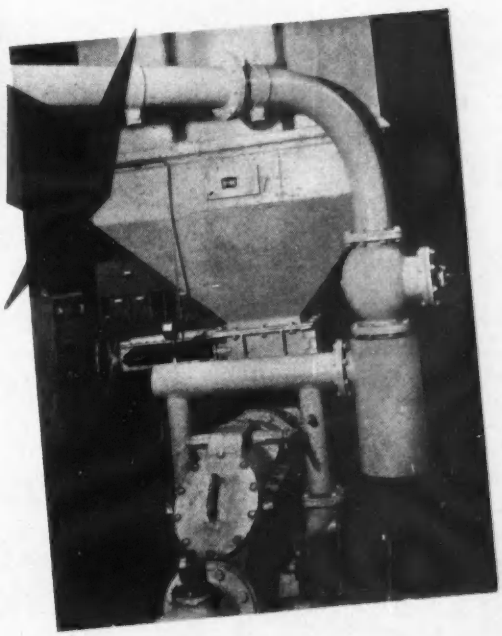

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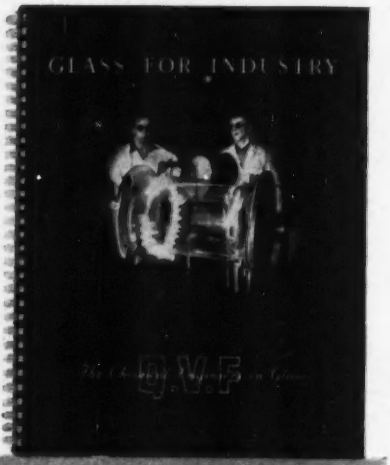

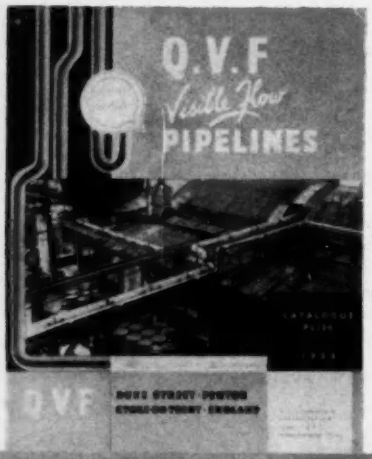

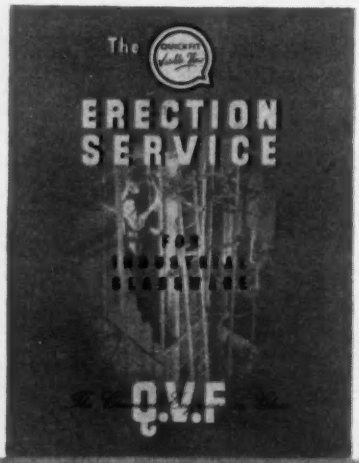

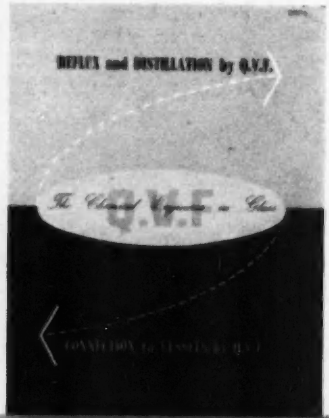

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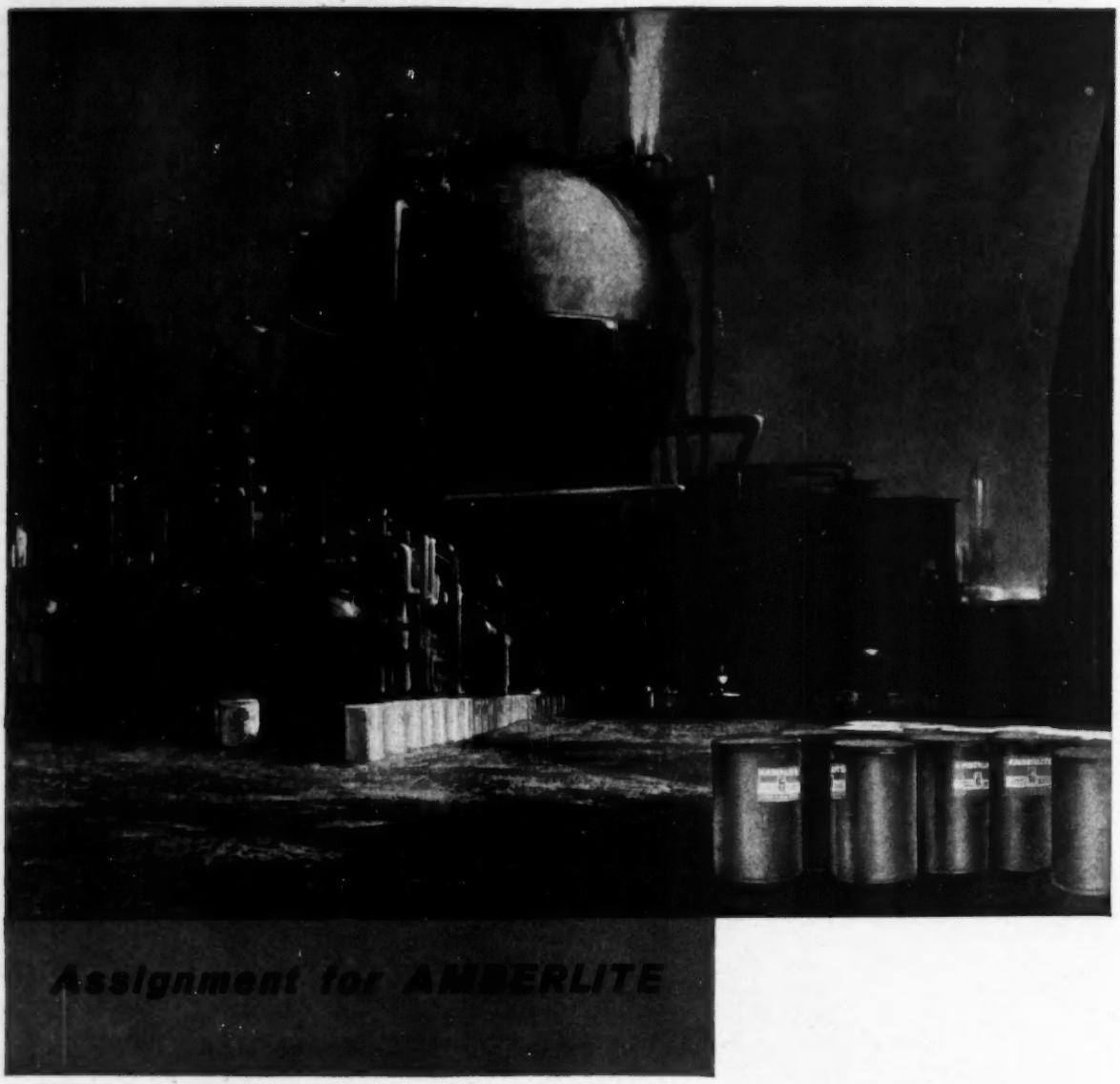

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AP13

VOL. 82 No. 2098
SEPTEMBER 26 1959

Telephone: FLEet Street 3212 (26 lines)
Telegrams: Allangas - Fleet - London

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CHEMICAL AGE

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EXPANSION SLOWDOWN?

THIS year has seen the start up of several large-scale chemicals plants, the expansion and modernisation of existing facilities and plans made to increase further the industry's capacity. Imperial Chemical Industries, Distillers Company, Monsanto Chemicals, Shell Chemical, and Union Carbide have been leaders in these activities. The exclusive CHEMICAL AGE survey of the U.K.'s new chemical plant projects on p. 391 shows how many plants have been completed this year, most of them on schedule. Those that have not been completed at the expected date have been delayed, in most instances, by strikes among the contractors' labour forces.

Studying this 10-page survey more closely it is noted that there are quite a few chemicals plants and extensions to chemical plants due to come into operation by early next year or towards the end of the year. But at the same time, it is obvious that there are few plants planned beyond 1960. Most of the new facilities in the planning stage appear to be for petrochemicals.

Has the U.K. chemical industry reached a period where little will be heard of plans for new plant? Since the last war ended U.K. chemical industry has grown out of all recognition. In the space of 15 years it has petrochemical facilities greater than any in Europe, and as was revealed last week, those of I.C.I. are now the largest outside the U.S.

Many feel that the U.K. chemical industry has caught up with that of the U.S. and while overcapacity has overshadowed the U.S. industry, there is little hint that there is overcapacity here. And this is despite the apparent non-existence of chemical market research in the greater part of the industry.

Capital outlays this year by the U.S. chemical industry are likely to be 4% less than in 1958 indicating a slowing down in the rate of expansion. U.K. capital investment in plant has already shown signs of slowing down, and this seems likely to be emphasised during the next three years. It is to be hoped, however, that despite price cuts brought about by keenly competitive export markets, the industry will not fail to continue to modernise its plant and equipment.

Unless we are misled by companies keeping their plans 'hush-hush', it is felt that too few are spending enough on modernisation. Even in the U.S. where modernisation of plant is widely preached chemical manufacturers, although planning to spend $24,500 million in the period 1959-1962, will only be replacing 70% of the obsolete facilities. To overcome obsolescence and provide the U.K. industry with modern plant in many instances will take a very high rate of investment.

The Budget this year restored investment allowances at the rate of 20% for new plant and machinery plus 10% initial allowance and 10% for new industrial buildings. (CHEMICAL AGE, 11 April, p. 610.)

Improved provisions for depreciation will, however, assist the industry in retaining more of the capital it needs to carry out modernisation plans. In particular, it is the smaller companies that require most assistance. To this end we are pleased to see that if returned to power the Government plans to encourage new factory building, and to include easier conditions for giving loans towards plant and equipment. Sir David Eccles, President, Board of Trade, in a recent speech in Glasgow, dealt with some of the 'major changes'

that should now be made and said "the conditions for receiving loans towards plant and equipment—that the firm should show it cannot raise the money from commercial sources—has proved a serious handicap and ought to be discarded."

The Conservative Party proposals would mean that two kinds of help would be available, subject to examination of the application by the Board of Trade with the aid of the regional controller: help in the building itself, either by subsidised rent or a capital grant, and help over services, plant and equipment and site clearance. At the same time, national economic policy should be to maintain price stability for unless this can be maintained, the industry's funds will not stretch far enough to carry through the modernisation required or the setting up of new plants, which by ensuring efficient and economic production of chemicals, will be the main contribution to our continued industrial strength and prosperity in the years ahead.

FAST PROCESS GAS CHROMATOGRAPHY

WHAT looks like paving the way to more process control uses for gas chromatography is the development by Phillips Petroleum in the U.S. of a process gas chromatograph which gives a single-compound analysis in 60 seconds or less.

Chromatography has already proved to be a very satisfactory process analytical method for volatile materials, particularly the lighter hydrocarbons. For direct process control, however, chromatography takes too long to complete, that is, some five to 15 minutes or more. Phillips Petroleum have speeded up the chromatograph by carefully matching instrument variables and by selecting, or designing where necessary, fast-acting hardware. Thus they decrease column diameter to about $\frac{1}{8}$ in., use either helium or hydrogen as carrier gas, depending on the stream being analysed, and lower ratio of liquid phase to column packing well below the standard 30%.

Also important in obtaining fast analyses is the sampling valve. This is a pneumatic diaphragm valve which gets an 0.05 ml. sample and delivers it undistorted to the chromatograph column. The thermal conductivity detector responds rapidly (full scale in 0.2 seconds), it is stated, because of its geometric design. Peak height of one selected component during each cycle is read by a programmer. A data converter converts the peak height to a concentration valve which is charted to give an almost continuous record of concentration. This signal can be also used directly for automatic process control.

At Phillip's butadiene plant in Texas, the high speed chromatographic analyser controller is being used to control a furfural extractive distillation column, where butene-1 and isobutylene are separated from butadiene. The chromatograph measures butene-1 plus isobutylene and controls steam to the column reboiler to maintain optimum separation.

Two columns are used in series in the present instrument. The first, 30 in. long is backflushed each cycle to prevent build-up of heavy components, and the second one is 40 in. long, but is not backflushed. Both columns are packed with tetraethylene glycol dimethyl ether deposited on 80 to 100 mesh firebrick.

ALDEHYDES BY NEW ROUTE

ALDEHYDES can now be made from aliphatic halides and alcohols using a new route developed by Purdue University chemists, Dr. Nathan Kornblum, Dr. Willard J. Jones and George A. Anderson (*J.A.C.S.*, 1959, 5 August, 4113). A dimethyl sulphoxide-sodium bicarbonate slurry is used to oxidise, in minutes, the tosylates (*p*-toluene sulphonic acid derivatives) of halides and alcohols. Aldehyde yields ranging from 70 to 75 per cent have been obtained.

The reaction has been found to work with relatively unreactive aliphatic compounds as easily as it does with more reactive ones, like benzylics. The only one that doesn't react is neopentyl tosylate. The reaction, however, appears to be the first available general method for converting aliphatic halides and tosylates to their aldehydes.

In earlier studies in 1957, Kornblum found that dimethyl sulphoxide worked well as an oxidising agent. The halide was dissolved in the reagent and the aldehyde was then separated. This system was not effective, however, with benzyl bromides or less effective material. In the new reaction, the tosylate is added to a suspension of sodium bicarbonate in dimethyl sulphoxide at 150°C. The reaction is complete after three minutes. Using benzyl tosylate instead of an aliphatic one, the oxidation takes five minutes at 100°C.

ANTIVIRAL AGENT

HELENINE, a mould product, is reported to be an active antiviral agent. Produced by *Penicillium funiculosum* using conventional fermentation procedures, helenine was first noted in 1953 by Dr. Richard Shope, at Merck Institute. Dr. Shope had first found the mould growing on his wife Helen's picture (hence the name helenine) when he was in the tropics during World War II.

The compound is found only in the mycelium and is not exuded by the mould into the nutrient medium. It has recently been purified and identified by four research workers at Merck Sharp and Dohme, led by Dr. Urban J. Lewis as a ribonucleoprotein (*J.A.C.S.*, 5 August, p. 4115). This puts helenine in the same class of compound as the virus it attacks. More work is required, however, on the structure of helenine. An immediate difficulty here is the compound's lack of stability and Merck are endeavouring to improve this. Dr. Lewis states that dissociation is definitely not oxidative but is most probably due to "mechanical weakness" of the structure of its large molecule. Helenine cannot be subjected to freezing or thawing, hence it may be best, it is considered, to modify the present buffered aqueous solution in which it is dissolved.

The answer to some of the more common virus diseases has been sought among the low-molecular weight antibiotics, but it appears that helenine is the first nucleoprotein found effective against viruses. Preliminary investigations have shown that helenine can prevent development of poliomyelitis in monkeys, when administered before symptoms appear, and that it can protect mice against a form of encephalitis and some other viruses. It may thus be that chemotherapy which has proved so effective against microbial infections, will prove to be the answer in the case of virus diseases.

Nitric Acid—Ketone Reaction Explosion at U.S. Chemstrand Lab.

AN assumption that 4-methylcyclohexanone would be easier to oxidise than its corresponding alcohol using a technique which had been successfully applied with 4-methylcyclohexanol previously led to an explosion at Chemstrand Laboratories, Decatur, Alabama, U.S. The blast pulverised apparatus and forced an ice bucket through a 1½ in. soapstone bench (*Chem. and Engng. News*, 1959, **37**, No. 35, p. 48).

Investigation into the cause of the explosion revealed an inherent difference in the reactivity of nitric acid with cyclic ketones *vs* cyclic alcohols. The literature, states Dr. W. T. Dye of Chemstrand, does not emphasise the difference in reacting cyclic ketones and alcohols strongly enough to safeguard the uninitiated. The reaction of nitric acid with either material is recorded as being potentially dangerous, but does not suggest that an explosion could result.

P.B. Report of the Office of Technical Services, U.S. Department of Commerce —Mechanism of the oxidation of cyclic compounds by nitric acid to dicarboxylic acids—records acid burns resulting from violent reaction with cyclohexanone, but states that the reaction can be carried out safely at 75°C. The mixture used by Dr. Dye of Chemstrand detonated at 76°C after being kept at 69° to 77°C during the ketone addition period of about one hour.

Following the accident, 4-methylcyclohexanol has been oxidised without difficulty although in one instance the reaction failed to start in the normal way. Caution is therefore urged in carrying out nitric acid oxidations.

I.C.I. Reorganise Two Research Departments

I.C.I. have reorganised the research departments of Billingham and Heavy Organic Chemicals Divisions to reduce the sharing of functions and give the two departments more complete control over their own design and operating services.

The research works group of the Billingham Division is discontinued and part of the services have been taken over by a research services department with Mr. H. Walton as manager. The other part of its duties is being taken over by the two research departments.

In H.O.C. Division there is now an administration group under Mr. A. B. Goggs, formerly deputy oil works manager.

Lectures at Kingston Technical College

A POST-GRADUATE course of eight lectures given by specialists from industry on Chemistry and Metallurgy of Rarer Metals will be given at Kingston Technical College on Tuesday evenings beginning 20 October.

A course of six lectures on Newer Methods in Organic Chemistry is to be given on Thursday evenings, beginning 29 October, by Dr. W. J. Hickinbottom.

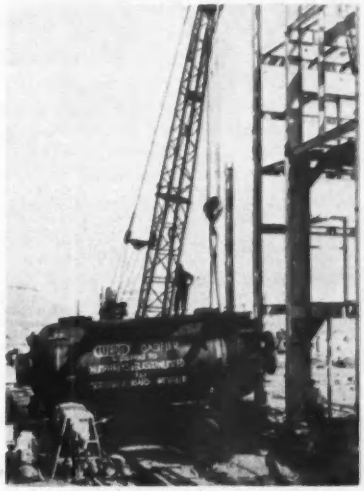
E

Lurgi Generator Arrives at Fife H.P. Gasification Site

THE first Lurgi generator for the high-pressure gasification plant being built by Humphreys and Glasgow Ltd., London, for the Scottish Gas Board at Westfield, Fife, has arrived at the site. The generator, which weighs 50 tons, will gasify low-grade coal supplied from adjacent opencast workings. The fuel, for which today there is little demand, contains up to 25% ash and 16% moisture. It will be completely gasified, leaving no resultant coke.

The generator will work normally at a pressure of 340 p.s.i. and a temperature of 450°C. Because of the high temperature, it has been surrounded by a water jacket to keep the walls cool. This also produces some of the steam needed for the gasification. Although the gas is produced continuously, coal is charged to the generator intermittently, and because of the high pressure in the generator, a special technique has to be used. Coal is first fed to a coal lock which is then pressurised. It is then charged to the generator and the lock depressurised ready for the next charge.

Initially, Humphreys and Glasgow will install three generators at Westfield. Two of these will be working together on completion of the first stage of construction (autumn 1960), when they will consume 490 tons of coal per day to produce 15 million cu. ft. of purified gas. Subsequent generators will be manufactured in Britain, and on final completion of the plant, estimated for June 1962, the total daily output will be 30 million cu. ft.



First of the Lurgi generators built by Humglas arrives at the Westfield, Fife, high-pressure gasification plant

Curran to Install Acid Recovery Plant at Ebbw Vale

PROCESS Plant Division of Edward Curran Engineering Ltd., Cardiff, known for their large pickling installations and continuous automatic spray pickling equipment, have signed an agreement with Zahn and Co. Ltd., Berlin and Hamelin, under which they are sole licensees for the sale and installation of Zahn plants in the U.K. and other parts of the world.

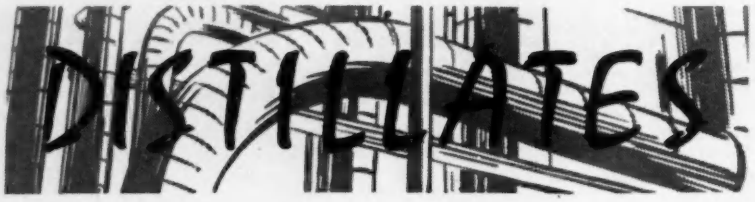
Zahn specialise in the development and design of regeneration plants for the treatment of waste pickling solutions. These plants include a spray evaporation system for the production of ferrous sulphate monohydrate and vacuum and rotary crystallisers for the production of ferrous sulphate heptahydrate. The Zahn process is a closed circuit system returning regenerated acid to the pickling lines thus increasing pickling efficiency by maintaining a more constant level of acid concentration.

Edward Curran have been awarded a contract to install a Zahn plant at the Ebbw Vale works of Richard Thomas and Baldwins. The plant will treat the spent pickling solution resulting from the production of 18,000 tons per week of steel strip, for the recovery of acid and the production of ferrous sulphate monohydrate. The plant, which will be one of the largest and most modern acid regeneration installations in the world and the first of its kind in this country, will make it impossible for any effluent from the acid pickling lines to reach the River Ebbw. The plant will have an ultimate capacity of 350,000 gall. per week.

Special Advanced Courses in Technology

SPECIAL advanced courses held in London and the Home Counties which do not regularly appear in college calendars or prospectuses as part of a grouped course, or as subjects offered for endorsement on Higher National Certificates, are listed in the Bulletin of Special Courses in Higher Technology. This is published by the London and Home Counties Regional Advisory Council for Higher Technological Education.

The courses are as a rule part-time, usually evening, courses, but full-time courses which are specially arranged and are not of longer than three months' duration are also included.



★ SINCE CHEMICAL AGE'S comment last week on the Conservative proposal to set up a Science Ministry if returned to power at the General Election, the Labour Party has made a similar promise in its manifesto. So whichever party is returned, Britain is destined to have a Minister of Science.

Speculation will now centre on two points—the terms of reference of such an appointment and who will be the first Minister. A possible danger might be to expect too much of the Minister, giving him responsibility for scientific matters relating to defence, other Government research, as well as the Department of Scientific and Industrial Research, the Medical and Agricultural Research Councils, atomic energy, etc.

A pointer to Conservative intention in this respect might be the 'news' that in the New Year Sir Solly Zuckerman will succeed Sir Frederick Brundrett at the Ministry of Defence and as chairman of the Defence Research Policy Committee. Chapman Pincher of the *Daily Express* reported this on Monday and added that an official announcement could be expected after the election. Ministry spokesmen will neither confirm nor deny the statement. If Pincher is correct, and my information leads me to believe he is, then one obvious candidate for a Minister of Science would have to be written off. Current Conservative favourite for the position is Mr. Reginald Maudling, Paymaster General, in the last Government.

★ AMONG many developments shown by the Plastics Group of the Metal Box Co. Ltd. at the Packaging Exhibition, the one that interested me most was the use of polypropylene to make blow-moulded bottles for powdered foods and chemicals. This new polymer makes possible the moulding of bottles with a thin wall section, giving considerable economies combined with protection and strength. The range of potential uses is expected to be greatly extended as development work continues. Bottles in high density polythene shown on the same stand were said to have greater resistance to detergents, oils and chemicals than those made of l.d. polythene; they also have lower gas permeability and can be made with a thinner wall because of the rigidity of h.d. polythene.

Also new was Metathene X-MXXT grade of cellulose film with an extrusion coating of diothene polythene film. This product is said to have a lower moisture vapour and gas transmission rates and a lower odour level due to a new combining technique. Interest was also shown in Melinex polyester film extrusion coated with Metal Box's Diothene polythene film—a combination that gives excellent water impermeability and neat sealing properties to the strength of Melinex. In the U.S. this product is the most widely accepted combination for boilable packs for foodstuffs.

★ IN THEIR Elastomers' Notebook (1959/9), Du Pont report an interesting evaluation made by a U.S. chemical producer on the use of hard rubber and Hypalon as pump linings in their caustic soda-chlorine unit. The hard rubber lining of each impeller and two-piece pump casing did not stand up to the process.

Three solutions are handled, each in separate pumps; 13% sodium hypochlorite up to 66°C; 30% sodium chloride brine up to 66°C; and 37% hydrochloric acid up to 82°C. The linings were interchangeable and Hypalon was fitted enabling a comparison to be made under identical exposure conditions. Since they were fitted, from December 1957, as the rubber-lined elements failed, the Hypalon linings have shown no evidence of chemical attack, while the linings they replaced lasted only a few months at the best.

★ A NEW Australian process that gives woollens the washable, drip-dry non-iron quality of some synthetics and cottons will not be patented, but will readily be made available to British and other firms. This is the most exciting development in wool since raw wool was first woven.

Experimental work was carried out by Dr. A. J. Farnsworth and Dr. J. McPhee of the Commonwealth Scientific and Industrial Research Organisation. The process is a flat setting one which involves wetting the fabric with a sodium bisulphate solution and steaming it damp on a blowing machine. It is said to have no adverse effect on colour or handling properties and can be applied before or after printing.

★ FOLLOWING his recent visit to Europe, Mr. Roger Williams, a U.S. chemical market researcher, says that making a market study is a harder proposition in Europe than in the U.S. In a recent issue of our U.S. contemporary *Chemical Week* (12 September, p 81) he refers to the "natural reticence of many Europeans, particularly about business matters." Market researchers have a difficult time learning anything through informal conversations or 'trade talk.'

He feels that most European market research men look backwards, at statistics and sales analyses, rather than forward to projections of potentials and sales. Williams, who is president of Roger Williams Technical and Economic Services, also speaks of Government information that may "sometimes present glaring errors, or gaps." He pinpoints another serious obstacle to a proper evaluation of a market potential —the quality of statistics. His criticism that most compilations of basic statistics are often several years old, will find many echoes in this country. U.S. chemical industry is much better served in this respect.

★ JAPAN'S challenging position in world markets is emphasised by the news that Alon, a textile fibre produced by acetylating high-tenacity viscose staple, is now in commercial production. The makers, Toho Rayon, claim to be the first company in the world to produce a cellulose ester fibre of this type on a commercial scale.

They state that Alon is cheaper than other synthetic fibres and has approximately the same strength and elongation of fibre as acrylic fibres produced by western manufacturers and compares well with them in crease resistance and elastic recovery. It has a specific gravity and handle similar to wool and is twice as strong.

Although the Japanese claim to be first, British and American companies have been working for some time on similar fibres. I am told Courtaulds are testing one, and their U.S. counterpart recently announced the production of Corval and Topel, though I do not know whether these fibres are yet being produced commercially.

★ MANY new colleges of technology are envisaged by Mr. Geoffrey Lloyd, Minister of Education. Speaking at the opening of new halls of residence at the Rugby College of Technology and Arts, the first halls to be completed under the current five-year plan, Mr. Lloyd said that the drive for technical education had now assumed the character of a national movement.

The plan, in fact, is producing an entirely new type of college which will provide an alternative route to the highest scientific and technological qualifications. New technical college buildings are now opening at the rate of one a week. The number of students taking these advanced courses is increasing even faster, however. For instance, students in their final year this summer numbered 137. But there were nearly 1,200 in their first year. The intake has increased by over 700% since 1956, and should speed the progress towards doubling the output of scientists and technologists by the late 1960s.

Alembic

New Chemical Plants in the U.K.

Featured in this exclusive *Chemical Age* table are large-scale expansion and modernisation projects, as well as smaller schemes, involving a total investment of many £ millions.
This survey includes chemical plants opened in the U.K. since the table was last published, on 22 November 1958, as well as those now under construction or in the planning stage. Notes are given in the final column on the stage of construction.

COMPANY	PLANT	PROJECT
Albright & Wilson (Mfg.) Ltd.	New plants for phosphorus pentasulphide and organic phosphorus compounds at Oldbury	Completed early 1959
	Extensions to oil additives production capacity	Completed
	Extensions to Kaingen facilities at Oldbury, Birmingham	Completed
	New pilot plant facilities at Barry, Glamorgan	Construction started
	Additions and modifications to dicalcium phosphate plant at Oldbury to raise outputs	In operation, May 1959 (Above projects designed and erected by Albright and Wilson (Mfg.) Central Engineering Department.)
Alchemy Ltd.	Medium sized maleic anhydride plant; contract placed with Petrocarbon Developments Ltd.	Scheduled for production during third quarter 1960
Anderson, James, & Co. (Colours) Ltd. (Member of Geigy Group)	Organic pigments plant at Paisley. Main contractors, M. Macdougall & Co. Ltd.	Due for completion mid-1960
	Grinding plant for organic pigments at Paisley. Main contractors M. Macdougall & Co. Ltd.	Being commissioned
Ashburton Chemical Works Ltd. (Member of Geigy Group)	17 new development laboratories for organic and pharmaceutical chemicals and products at Trafford Park, Manchester. Main contractor, Gerrard Ltd.	Due to be completed early 1960
Associated Chemical Co. Group	Sulphuric acid plant 100 tons/day at Eaglescliffe, Co. Durham, giving 98.6 acid using Chemibau Dr. Azieren GmbH Process. Contractor, Power-Gas Corporation Ltd.	In operation
Bakelite Ltd.	Epoxide resin plant production capacity increased by 60%	In operation end 1958
Beck Koller Co. Ltd.	Extension of plastics plant capacity, particularly reinforced plastics	In hand
Beecham Group	Antibiotics plant at Worthing	Construction begun
B.I.P. Chemicals Ltd.	Polyester resin plant at Oldbury. Produces 1,000 gall. batches of polyester resin automatically. Control system engineered by Hygrotherm Engineering Ltd., in collaboration with Negretti and Zambra Ltd.	Completed
	Formaldehyde plant at Oldbury, Birmingham, to produce 75 tons/day of 37%w/w formaldehyde solution. Design, engineering and construction by Leonard Smith (Engineers) Ltd.	Completed July 1959
Bitmac Ltd.	£70,000 tar distillation plant with throughput of 125 tons/day. Plant being supplied and erected by Chemical Engineering Wiltons Ltd.	Due in operation end October 1959
Bowmans Chemicals Ltd.	New lactic acid plant at Widnes using process based on solvent extraction: produce equivalent of 2,000 tons/year pure lactic acid	On stream April 1959
B.P. Trading Ltd.	Copper chloride unit to process 2,000 barrels/day raw kerosene at B.P. Refinery (Grangemouth) Ltd. Engineered and constructed by Power-Gas Corporation	Completed
	Kerosene raffinate soda washery at B.P. Refinery (Grangemouth) Ltd. Engineered and constructed by Power-Gas Corporation	Completed
	De-ethaniser unit to remove ethane from an ethane-propane mixture at B.P. Refinery (Grangemouth) Ltd. Engineered and constructed by Power-Gas Corporation	Completed

COMPANY	PLANT	PROJECT
British Celanese Ltd.	40% expansion of petrochemicals plant at Spondon. General contractors, Constructors John Brown Ltd. (C.J.B.)	Well on way to completion
	Vinyl acetate plant at Spondon—capacity to be doubled. Courtaulds Engineering Division are supervising various contractors	Work in hand
British Cellophane Ltd.	£3 million factory at Barrow-in-Furness to produce Cellophane cellulose film	In operation
British Hydrocarbon Chemicals Ltd.	Gasoline treater using a BP process. Contractors, Lummus	Mid-1960
	Phenol-from-cumene plant at Grangemouth using D.C.L.'s own process and design of Scientific Design Co; capacity 150,000 tons by 1960	Expected in operation towards end of 1959
	Third ethylene plant at Grangemouth with 70,000 tons/year capacity. Contractors, Stone and Webster; process, Stone and Webster	Mid-1960
	'Rigidex polyethylene' plant at Grangemouth of 11,000 tons/year capacity using Phillips process. Contractors, Stone and Webster Ltd., with sub-contractor George Wimpey & Co. Ltd.	Now being commissioned
British Oxygen Chemicals Ltd.	Two large air separation plants—at Shellhaven and Carrington	Installed. Shellhaven plant 100% Completed and in operation
	200 ton/day oxygen plant at Westfield, Fife, for Scottish Gas Board	Under construction
British Oxygen Co. Ltd.	Low temperature distillation plant for argon purification. Purifies 3,300 cu. ft./hour	Completed and due in operation September 1959
British Oxygen Gases Ltd.	Plant for industrial gases, Polmadie, Scotland. Main contractor, John Laing	In operation September 1959
	New works at St. Helens to supply oxygen and other industrial gases. Plant being built by British Oxygen Engineering Ltd. Building and civil work by Contractors (Manchester) Ltd., with B.O.E. as architects	Under construction; due on stream about December 1959
British Oxygen Linde Co. Ltd.	Tonnage oxygen plant to produce 240 tons oxygen and 235 tons nitrogen per day for ammonia production at Shellhaven for Shell Chemical Co. Ltd.	Completed
British Titan Products Ltd.	Modifications to gas-cleaning plant at Billingham. Contractor, Chemical Engineering Wiltons Ltd.	Completed
	£2 million extensions to Grimsby plant to give total capacity of 70,000 tons/year titanium dioxide. Contractor, Chemical Construction (G.B.) Ltd. (Chemico)	Completed, May 1959
	Contact sulphuric acid plant at Grimsby with capacity of 180 tons/day Contractor, Chemico	Completed, May 1959
	Ferrous sulphate (copperas) decomposition plant at Grimsby. Contractor, Chemico	Commissioning started September 1959
	Contact sulphuric acid plant with 250 tons/day capacity at Billingham. Contractor, Chemico	Commissioning in last quarter of 1959
Carbide Industries Ltd.	Calcium carbide and acetylene plant at Maydown, Londonderry, N. Ireland. Main contractors, British Oxygen Engineering Ltd.	Due to be commissioned early 1960
Carless, Capel & Leonard Ltd.	Plant for 2-3 million lb. high quality crude tar acids erected by company	Commissioned spring this year
	Extension to hydrocarbon solvents distillation capacity to give 5 million gall./year. Designed by company together with C.J.B.	Due to be commissioned Autumn 1959
Chemstrand Ltd.	£3.5 million plant for acrylic fibre, at Londonderry, N. Ireland, to produce 10 million lb./year. Contractor, Constructors John Brown	In operation February 1959
Ciba (A.R.L.) Ltd.	Araldite epoxy resin factory at Duxford	Completed May 1959
	Formaldehyde plant at Duxford, Nr. Cambridge to produce 45 tons/day of 37%w/w formaldehyde solution. Design, engineering and construction by Leonard Smith (Engineers) Ltd.	Completed July 1959
Clayton Aniline Co. Ltd.	Dyestuffs plant at Clayton, Manchester, will use Clayton aniline processes. Main contractors, Humphreys and Glasgow Ltd. Further projects as part of the company's modernisation scheme are under consideration	Due for completion by mid-1960
Coalite and Chemical Products Ltd.	Plant for manufacture of chlorinated products	Commissioned

COMPANY	PLANT	PROJECT
Colloidal Graphite Ltd.	New facilities at existing plant at Sheffield for colloidal graphite and colloidal glass dispersions (100% increase in capacity) and colloidal molybdenum sulphide dispersions and various graphite products. Contractor, Thos. W. Ward Ltd.	Due to be completed mid-September 1959
Consolidated Beryllium Ltd.	Beryllium-copper master alloy plant at Avonmouth	Due in operation end-1959
Courtaulds Ltd.	£500,000 plant at Greenfield Works, Holywell, N. Wales, for CS_2 recovery (code name 'Landmark'). Designed by Courtaulds' chemical engineers and the company's Engineering Division	Completed May 1959
Cowburn, W. H., and Cowpar Ltd.	50 ton/day sulphuric acid plant at Manchester. Contractor, Chemical Engineering Wiltons Ltd.	In operation May 1959
Cray Valley Products Ltd.	£100,000 extensions to synthetic resin plant at Machen, Mon., to raise capacity by 50%	Due to be completed early 1960
Crosfield, Joseph, and Sons Ltd.	£1 million plant for alkaline detergents, silica gels, etc., first part of £5 million re-building programme. Designed by Crosfield engineers in close conjunction with Unilever Technical Division. General contractors, A. Monk & Co. Ltd., and Matthew Hall Ltd., consulting engineers	Completed July 1959
Cruickshank, R., Ltd.	6,000 sq. ft. extension of plant facilities for production of hydrofluoric acid, fluorides and derivatives. Main contractors, Stockholding and Steel Construction Ltd.	Completed August 1959
Distillers Co. Ltd.	Plant at Hedon, Hull, for phthalate esters of aliphatic alcohols. Uses a D.C.L. process; designed and built by D.C.L.	Commissioned, May 1959
Distillers Co. (Biochemicals) Ltd.	£80,000 plus pharmacological laboratory for product testing and investigation. Main contractor, Sir Alfred McAlpine & Son Ltd.	Due to be opened November 1959
Dow Agrochemicals Ltd.	£1 million agricultural chemicals (Dowpon, etc.) plant at King's Lynn. Contractors, Constructors John Brown Ltd.	Construction started in July, due for completion July 1960
Du Pont Co. (United Kingdom) Ltd.	Plant for production of neoprene at Maydown, Londonderry, N.I. Capacity will be sufficient to supply U.K., Europe, Middle East, Africa and Australia. Contractors are Du Pont	Production expected to begin early April 1960
East Midlands Gas Board	Tower purifiers for H_2S removal. Using Newton Chambers mechanical iron oxide discharger and automatic operator for sequence rotation of towers. Contractor, Newton Chambers Ltd.	Contract awarded
	Two crude benzole plants of Sheffield Gas Works, Grimesthorpe, with maximum capacity of 8,750 gall./week; Neepsend with 10,500 gall./week. Production of both to be sent to Benzole Producers Ltd. Contractors for both, W. C. Holmes & Co. Ltd.	Grimesthorpe plant on stream June 1959; Neepsend plant, September 1959
Esso Petroleum Co. Ltd.	£10 million facilities for 40,000 tons ethylene and 42,000 tons butadiene at Fawley Refinery. Ethylene plant uses steam-cracking process; butadiene is produced by Esso dehydrogenation process	Opened December 1958
Evans Medical Ltd.	New research laboratories at Speke, Liverpool	Opened June 1959
Fisons Ltd.	Ammonium nitrate handling plant, Widnes	Opened 23 June, 1959
	£4.25 million fertiliser plant, producing ammonium nitrate 400 tons/day and 223 tons nitric acid 100% basis/day at Shellhaven. Contract awarded to Chemical and Industrial International, Nassau, Bahamas, with Constructors John Brown	In operation from June 1959
Gas Council	Storage facilities, etc., for liquid methane at Canvey Island, Essex. North Thames Gas Board as designers. Constructors, A.P.V. Co. Ltd. and Whessoe Ltd.	Completed early 1959. In operation since March 1959
Goulding, W. & H. M., Ltd.	£2 million fertiliser factory at Marina Works, Cork. £1 million contract with Simon Carves Ltd. for sulphur burning contact-type sulphuric acid plant with 70,000 tons/year 100% acid capacity and plants for production of 200,000 tons/year superphosphates and compound fertilisers	Design and planning stage
Graesser, R., Ltd.	£150,000 continuous tar distillation plant of 12,000 gall./day capacity; to produce phenol cresols and xylenols, etc. Contractors, Newton Chambers Ltd.	Now being commissioned for production in October
Guernsey Gas Light Co. Ltd.	Continuous reforming plant at Guernsey to produce 2.6 million cu. ft. of town's gas/day from commercial butane	Order in hand
Howards of Ilford Ltd.	Acetylsalicylic acid plant capacity increased and process improved at cost of £60,000	First part of major rebuilding programme completed. Plant on stream end-July 1959

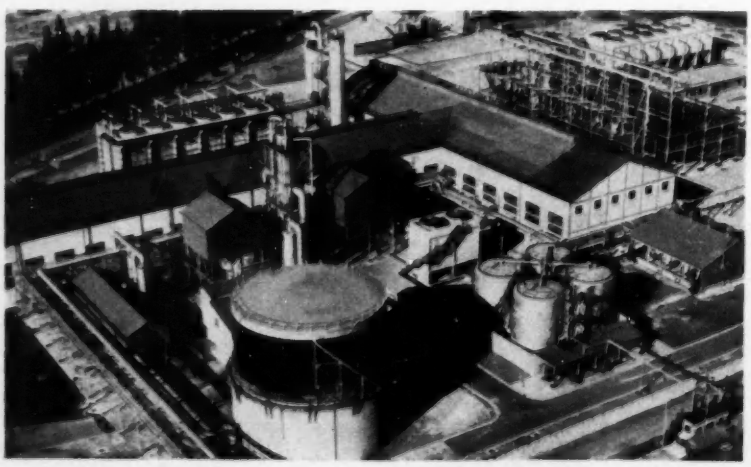
COMPANY	PLANT	PROJECT
	Phthalic anhydride plant of 3,000 tons/year capacity to use Ftalital process. Contractor, Chemical Engineering Wiltons Ltd.	Due to be completed end 1959
Imperial Chemical Industries Ltd.		
Billingham Division At Billingham	Oil gasification plant for ammonia production using Texaco process. Capacity 60,000 tons/year	Plant partly commissioned and in production
	Drikold plant extension	First stage in operation
	Concentrated complete fertiliser (C.C.F.) plant comprising granulation plant and storage silo, 300,000 tons/year capacity	Completed
	Plant for nitrogen potash fertiliser (Kaynitro)	On stream, January 1959
	Oil-gasification plant for large-scale production of hydrogen. Automation and control instruments section by C.J.B.	Completed March 1959
	Extensions to methylamine plant	Completed
At Heysham	Extensions to methanol plant	Construction well under way
	Extensions to nitro-chalk capacity	On stream, December 1958
	Extension to ammonia oxidation capacity for nitric acid production	No. 1 unit on stream, November 1958 No. 2 unit on stream, January 1959
Fibres Division	Further extension of Terylene (polyester fibre) capacity	Under construction, due to be completed 1962-63
General Chemicals Division	£3 million development at Cassel Works, Billingham, includes acrylonitrile plant using acetylene and hydrogen cyanide. First large-scale unit of its kind in U.K.	Acrylonitrile plant in operation by end 1959
	Methyl methacrylate	Fully commissioned
	Chlorobenzene plant	Has reached designed capacity
	Large scale development plant for high-quality semi-conductor grade silicon at Merseyside with capacity approaching 4,000 lb. a year	Nearing completion. Plans for even greater production described as well advanced
Heavy Organic Chemicals Division	Third olefin plant at Wilton to raise capacity to 110,000 tons/year of ethylene. Constructed by Kellogg	In operation early 1959
	Third carbonylation plant at Billingham; plasticiser alcohol output raised to 60,000 tons/year	In operation early 1959
	Additional alkylated tar acid capacity at Billingham; terbutol and nonyl phenol	In operation early 1959
	Extension to plants for isopropanol, acetone, butanols, alcohols and phenol	Design completed. Under construction
Metals Division	Beryllium plant with initial output of 10 tons/year	Plant under construction
Nobel Division	Plant for wide range of methyl cellulose grades at Dumfries. Capacity sufficient to satisfy existing and anticipated U.K. demands	Completed
	Plant for production of paraformaldehyde flake	Completed mid-1959
	Large-scale isopropyl nitrate plant at Ardeer	Completed 1959
	Plant for concentrating dilute nitric acid by magnesium nitrate process at Ardeer	Due to be completed 1961
	Plant for dilute nitric acid production at Ardeer. Will use intermediate oxidation pressure plant	Due to be completed mid-1960
	Extensions to silicones plant. Capacity increased five-fold	Completed in 1958 and in operation
	Pentaerythritol plant	Now at designed level of production
	Second remote controlled Biazzi nitroglycerine plant at Ardeer	Commissioned December 1958
Plastics Division		
At Billingham	Diakon moulding materials plant. Output to be built up to final capacity in 2-3 years	In production

COMPANY	PLANT	PROJECT
At Dumfries	Melinex polyester film with eventual capacity of 2,000 tons-plus/year. To supply home needs, eliminate imports and have export surplus	Due to be completed end-1960
At Wilton	Plant to produce Propathene (polypropylene) under Montecatini and Montecatini-Ziegler licences. Contractor, Constructors John Brown	In design stage scheduled to be completed
	Terephthalic acid plant with 30 million lb./year capacity	Due to be completed 1960
Severnside Project	£100 million petrochemical complex	Planning permission granted. Scheduled on stream 1970 onwards
International Synthetic Rubber Co.	New plant for general purpose synthetic rubber latex at Hythe, Southampton. Designed to produce 2½ million gall./year. Will add the equivalent of 10% to the 70,000-ton capacity of the main plant	Construction started
Lancashire Tar Distillers Ltd.	£540,000 reconstruction programme at Cadishead Works, includes: Light oil distillation plant of 150 tons/day capacity. Main contractors, Proabd (England) Ltd.	On stream, February 1959
	Benzole hydrorefining plant of 100 tons/day capacity of crude benzole and tar naptha. Main contractors, Lurgi, Frankfurt, W. Germany, and construction by Simon-Carves Ltd.	On stream, 25 May 1959
	Distillation plant for hydro refined spirit of 40 tons/day capacity. Main contractors, R. & J. Dempsters Ltd.	To come on stream September 1959
	Pyridine extraction unit of 5 tons/day capacity. Contractors, Proabd (England) Ltd.; own construction	On stream September 1959
	Pyridine extraction unit of 5 tons/day capacity. Main contractors Proabd (England) Ltd.; own construction	To come on stream in 1960
Lankro Chemicals Ltd.	New plant at Eccles as follows: Continuous neutralisation and washing plant for phthalate esters, increasing capacity by about 25%	In operation since January 1959
	Manufacturing facilities for stabilisers (organo-metallic type) for p.v.c. processing	Commissioned February 1959
	Storage and handling facilities for liquid phthalic anhydride	Commissioned July 1959
	Plant to manufacture ethylene and propylene oxide derivatives	Start-up due September 1959
Laporte Chemicals Ltd.	£2½ million hydrogen peroxide (high strength) plant, Baronet Works, Warrington, Lancs. Uses Laporte's own process. Main contractor, Matthew Hall	On stream, November 1958
Lincolnshire Chemical Co. Ltd.	New benzole refinery at Scunthorpe	Just being commissioned
Magnesium Elektron Ltd.	£1 million scheme for quarrying and processing dolomite at Hopton, Derbyshire	'Go ahead' given
May & Baker Ltd.	Chemical factory at Norwich for production of caffeine, theobromine, selective weedkillers. Contractors: H. Pointer (Norwich) Ltd., R. G. Carter Ltd.	Being developed on 20-year plan
Merch Sharp & Dohme Ltd.	£1 million pharmaceutical manufacturing facilities. Present part of 15-20 year expansion scheme to cost about £500,000. Main contractor, Holland and Hannen & Cubitts Ltd. and associated companies	In operation January 1960
Midland Silicones Ltd.	New silicone fluid and silicone resin plant capacity at Barry to raise installed capacity by three times. Main contractors, Midland Silicones	Partly completed; due for completion first half 1960
	Additional plant capacity at Barry	In hand
	New plant at Barry	Planned
Midland Tar Distillers	Plant to make 2-vinyl pyridine from α-picoline	In operation in February
	Tar distillation plant at Nechells	In operation
Monsanto Chemicals Ltd.	£3½ million high-pressure polythene plant with capacity of 10,000 tons/year. Designed by Monsanto Chemicals; civil engineering, Sir Alexander Gibb & Partners	Completed and in operation May 1959. Increased capacity in hand
	Modernisation and expansion of production facilities for aspirin and phenacetin; also for intermediates, salicylic acid and paraphenetidine at Ruabon. Designed by Monsanto Chemicals	Under construction, due in operation 1960-61. In operation September 1959

COMPANY	PLANT	PROJECT
	Expansion of production facilities for Santocure M.O.R. at Ruabon. Designed by Monsanto Chemicals	Due in operation 1960-61
	New plant for Santoflex IP/CP at Newport, Mon. Designed by Monsanto Chemicals	Interim production already started. In full operation 1960-61
	15 million lb./year maleic anhydride plant at Newport, Mon. Will use process of Scientific Design Inc., New York, U.S.	Scheduled for completion second half 1960
Morson, Thomas, & Son Ltd.	£150,000 new general organics unit at Summerfield Chemical Works, Enfield, Middx., for production of new drugs, developed by parent company, Merck Sharp & Dohme International, U.S. Building contractors, Turriff Construction Corp.; installation engineers, Jennings Bros.	Opened officially 3 July, 1959
Murex Ltd.	£400,000 tantalum/niobium plant at Rainham, Essex	Substantially completed
Murgatroyd's Salt and Chemical Co. Ltd.	New plant for compression of electrolytic hydrogen for sale in bulk in trailer-mounted cylinders at Elworth, Sandbach, Cheshire. Plant was designed and constructed by the Engineering Division, Distillers Co. Ltd. (compressors from Maschinenfabrik Esslingen, Stuttgart; transport cylinders, Stahl & Rohrenwerk Reisholz GmbH.	Commissioned Spring 1959
National Coal Board South Western Division	Complete coke oven and by-product plant, including steam and electric power plant and biological plant for treatment of coke oven effluent liquor; 108 coke ovens with throughput 1,350/1,530 tons of coal/day at Cwm Colliery, S. Wales. Contractors, Simon-Carves Ltd.	Completed
Durham Division	Coke oven and by-product plant at Murton, Co. Durham, to produce 250,000 tons coke/year, 7½ million cu. ft./day of purified gas, and by-products concentrated ammoniacal liquor, tar and 1 million gall. crude benzole. Main contractors, Woodall-Duckham Construction Co. Ltd.	Completed
	Underground gasification pilot-plant project at Newman Spinney. Contractor, Humphreys and Glasgow	Completed and in operation early part 1959. Project is being abandoned
North Thames Gas Board	Romford gas-reforming plant	Officially opened 1 May, 1959
	Wet contact sulphuric acid plant. Supplied by acid section of Huntington, Heberlein & Co., through Woodall-Duckham Ltd.	In operation
	Creosote oil distillation plant at Product Works, to treat light creosote fraction for production of naphtha, crude phenols and naphthalene	Under construction
North Western Gas Board	£2 million commercial high-pressure gasification of coal plant, Partington; capacity, 7½ million cu. ft. gas/day. Main contractors, Humphreys & Glasgow Ltd.	In design stage with parts under construction, expected to be operating early 1960
Northern Gas Board	Segas oil gas plant of 2 million cu. ft./day at Darlington. Designed, supplied and installed by Power-Gas Corporation	Under construction
	Concentrated ammonia liquor plant and wet purification plant at Hendon. Contractor, Chemical Engineering Wiltons Ltd.	All material ordered
	£4 million coking plant at Murton, Co. Durham, with capacity of 250,000 tons coke/year, 7½ to 8 million cu. ft. purified gas/day. By-products will include ammoniacal liquor, tar, and 1 million gall. crude benzole/year	In operation
Petrochemicals Ltd. (Shell Chemical Co. Ltd.)	Polyolefin plant to produce LP polythene and polypropylene at Carrington Works, near Manchester. Capacity 30,000 tons a year of olefins L.P. polythene using Ziegler licence and polypropylene, using Shell process based on Ziegler and Natta's work. Contractors, Lummus Co. Ltd., with George Wimpey & Co. Ltd.	Due on stream 1961
	Ethylene oxide plant 30,000 tons/year at Carrington	Due on stream late 1959
	£2 million petrochemical development programme at Carrington	Planning stage
Petrolite Ltd.	Chemical plant at Kirby, Liverpool. Contractors, Blaw-Knox Chemical Engineering Co. Ltd.	Erection started; scheduled for completion by end of 1959
Pfizer Ltd.	Additional facilities for antibiotic production plant for Terramycin, Tetracyn and Matromycin to increase output, costing "several hundred thousands of pounds". Main contractors, G. N. Haden & Sons Ltd. (piping), C. Jenner & Son Ltd. (building), S. W. Bligh Ltd. (electrical), Stainless Steel Vessels Ltd. (tanks, etc.), Clark Bros. (compressor equipment)	Now due in operation

COMPANY	PLANT	PROJECT
	£100,000 pilot plant for investigational and developmental work on fermentation and organic synthesis compounds. Contractors as above	Completed June 1959
	£80,000 unit for blending filling and packaging of sterile materials. Contractors as above, plus Viaduct, Heating & Ventilating Ltd.	Completed July 1956
	£1 million vaccine production unit at Sandwich, Kent	Completed March 1959
	Microbiological research unit	Completed July 1959
	Pharmacological extensions of about 5,500 sq. ft.	Planned
	Vaccine development building of about 4,000 sq. ft.	Planned
Reichhold Chemicals Ltd.	Expansion of phthalic anhydride facilities	Due in operation by October 1959
Richard Thomas & Baldwins Ltd.	Biological plant at Ebbw Vale for treatment of coke oven effluent liquor	Work in progress
	Zalm sulphuric acid recovery plant, capacity 350,000 gall/week	Ordered
Riker Laboratories Ltd.	£70,000 additional factory facilities at Loughborough for tablet production, aerosol filling, etc. A further £15,000 to £20,000 will be spent in re-organisation of main factory	Completed August 1959
Scottish Gas Board	Lurgi pressure gasification plant at Westfield Works, Fifeshire, with gas purification, air separation and steam raising plants. Will supply new high pressure gas grid with 15 million cu. ft./day. Main contractor, Humphreys & Glasgow (in association with Power Gas) and Newton Chambers Ltd. for Bischoff tower purifiers	Stage 1 to be completed 1960-61 (15 million cu. ft. gas/day); Stage 2 by 1962-63 (30 million cu. ft. gas/day)
	£750,000 tonnage oxygen plant at Westfield, Fifeshire, for Lurgi gasification plant project to produce 200 tons O/day. Will include Tonnox oxygen storage system for 550 tons liquid oxygen. Contractor, British Oxygen Linde Ltd.	Scheduled to be in production latter half 1959
	Tower-type oxide purifiers at Coatbridge to purify coke oven gas from iron and steel works, capacity 18 million cu. ft./gas/day. Main contractor, Newton Chambers	Due for completion October 1959
	Tower type oxide purifiers at Edinburgh to replace and supplement existing capacity. Capacity of purifiers, 12 million cu. ft. gas/day. Main contractor, Henry Balfour	Due for completion 1959-60
Scottish Tar Distillers Ltd.	£19,500 continuous tar acid refining plant at Falkirk works to produce full range of tar products, including phenol, *o*- and *m*-cresol cresylic acid, xylenol fractions, etc. Designed and erected by Proabd (England)	In operation July 1959
Shell Chemical Co., Ltd.	£6.5 million fertiliser plant with production capacity of 75,000 tons/year ammonia and 320 tons 5.8% nitric acid daily at Shellhaven, Essex. Main contractor, Lummus with C. J. B. as chief sub-contractors	In operation end-May 1959
	£2 million hydrodesulphuriser plant at Shellhaven using Shell 'trickle-phase' technique, will produce 20 tons sulphur/day	Expected to be in operation by end 1959
	£1 million pipeline system to connect Shell Refinery at Stanlow with Shell Chemical at Carrington	Work started in May; to be completed by end 1959
Smith Kline and French Laboratories Ltd.	£1 million pharmaceutical manufacturing facilities and research laboratories at Welwyn Garden City	Commissioning date, August 1959
Solway Chemicals Ltd.	Expansion of sulphuric acid and cement capacity at Whitehaven by construction of a third kiln, a contact sulphuric acid plant and ancillary services. Plant to be expanded by 50%. Existing plant produces both cement and H_2SO_4 at rate of 100,000 tons a year each	Under construction
South Eastern Gas Board	Segas oil gas plant of 20 million cu. ft./day at Isle of Grain. Designed, supplied and installed by Power-Gas Corporation Ltd.	Completed
	£124,804 tar recovery plant at Ordnance Wharf, East Greenwich. Contractors, Whessoe Ltd.	In hand
	Oil gasification plant (Shell) at Isle of Grain with oxygen plant and plans for H_2S removal, CO conversion, and CO_2 removal; to produce more than 18 million cu. ft. gas/day	Due for completion 1960
South Western Gas Board	New gas-from-oil plant to be sited in Bristol area	Postponed
South Western Tar Distillers Ltd.	Phthalic anhydride plant at Totton Works, Southampton. Capacity 3,000 tons a year, using Saint Gobain, Chauny & Cirey, of Paris know-how, etc. Contractors, Burt, Bolton, & Hayward Ltd.	Scheduled to be in production April 1960

COMPANY	PLANT	PROJECT
Southern Gas Board	Segas oil gas plant of 7 million cu. ft./day at Reading. Designed, supplied and installed by Power-Gas Corporation Ltd.	Under construction
	Three gas dehydration plants for Southampton, Reading and Hilsea. Contractor, Chemical Engineering Wiltons Ltd.	In hand
	Gastechnik purifier installation, capacity 8 million cu. ft./day and sulphur extraction plant. Contractors, Power-Gas Corporation Ltd.	Under construction
Thorium Ltd.	Extensions to thorium nitrate plant	Under construction
Union Carbide Ltd.	£3 million plant for ethylene oxide and derivatives. Manufacturing facilities will include installations for production of ethylene oxide, ethylene glycols, polyethylene glycols, ethanolamines, glycol, ethers and specialised products. Production capacity of 45 million lb. annually. Contractors for building civil and mechanical work, George Wimpey & Co. Ltd., basic design being supplied by Union Carbide Corporation	Expected on stream end of 1959
	Polythene plant capacity at Grangemouth to be doubled. Scheduled to produce 30 million lb./year	To be in production by late 1960
United Kingdom Atomic Energy Authority	Chemical plant extensions at Windscale will include new cooling pond and advanced gas-cooled reactor	To be completed by 1961
	£12 million uranium plant at Springfields, Lancs. Capacity stated to be in excess of 1,000 tons uranium fuel a year	Now in operation
	Plant to recover radioactive caesium from highly active waste materials. Contract for design of plant awarded to W. J. Fraser & Co.	In design stage
Wales Gas Board	Gastechnik plant at Port Talbot with sulphur recovery carried out at Cardiff. Purification capacity of 6 million cu. ft./day; can be extended to 10 million. Overall cost £111,000. Main contractors, Robert Dempster	Purifier vessels undergoing operational test. Order not yet placed for solvent extraction plant
Wellcome Research Laboratories	£2 million research and production facilities for biological products, including polio vaccine at Beckenham	Phase 1 completed in January 1957 at cost of £250,000. Phase 2 completed at end-1958 at cost of £800,000. Phase 3 still in early stages, estimated to cost £500,000
West Midlands Gas Board	£80,000 contract for carburretted-water-gas plant at Etruria Gasworks, Stoke-on-Trent. Capacity is 3 million cu. ft./day. Erection by G. A. Poole Ltd.	Completed February 1959
	£6.5 million Lurgi total gasification plant at Coleshill	Final approval for project in sight
Whiffen & Sons Ltd.	Ethylene urea plant at Loughborough. Capacity is sufficient to meet whole of U.K. demand and provide a substantial amount for export	Completed early 1959
Williams (Hounslow) Ltd.	New plant for production of foodstuff colours	In operation February 1959



Ammonia Synthesis Plant at Modderfontein to be Expanded

Synthesis section of the African Explosives and Chemical Industries ammonia plant at Modderfontein. A new synthesis section to produce additional anhydrous liquid ammonia, designed by I.C.I. Billingham Division, is, with certain exceptions, being engineered and supplied by the Power-Gas Corporation

First Stage of Crosfield Building Project Completed on Schedule

FIRST phase of the extensive factory re-building programme of **Joseph Crosfield and Son Ltd.,** due for completion in 1965, was completed on schedule in July when the chemicals building started production. This plant has cost over £1 million and has a total floor area exceeding 70,000 sq. ft. Initially, production is being concentrated on industrial detergents and silica gel but responsibility for the manufacture of other products will be assumed as the plant gets into its stride. A feature of the building is the warehouse and loading bay on the ground floor, over which the manufacturing unit is built; this minimises handling and space.

As the chemicals building neared completion, demolition of the Mersey Wharf warehouse was begun to clear the site for the £¾ million new technical and research centre—the second phase of factory re-building. Unlike the chemicals building, which is built largely of Accrington brick to blend with surrounding plant, less conventional cladding will be used for the research technical centre to give an overall effect of contemporary design.

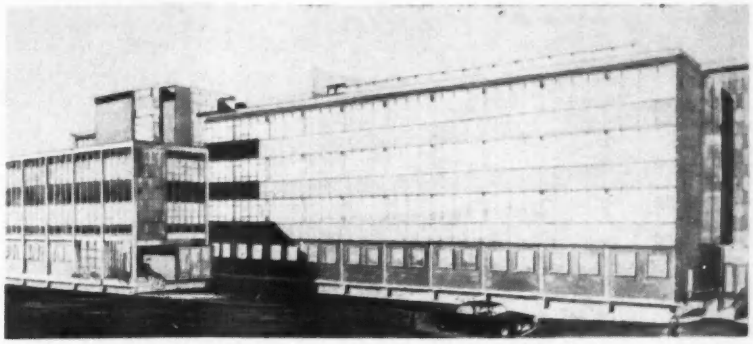
Research, technical service, experimental laundering, development and quality control will all be conducted from the main block of the new centre which has four floors and an overall area of about 50,000 sq. ft. In the smaller administration block will be the reception area, conference room and reference library. One feature of the centre will be the 60 ft.-high central well in which pilot plant can be erected without obstruction. Another innovation will be that all air entering will pass through water filters before being heated and circulated—a means of reducing interior pollution by airborne contaminants.

Supervising the design, layout and execution of all new buildings is a team of Crosfield engineers and technicians who work in close conjunction with Unilever Technical Division. A. Monk and Co. Ltd. are the general civil contractors for both chemicals building and the new centre, while Matthew Hall Ltd. were the consulting engineers for the former.

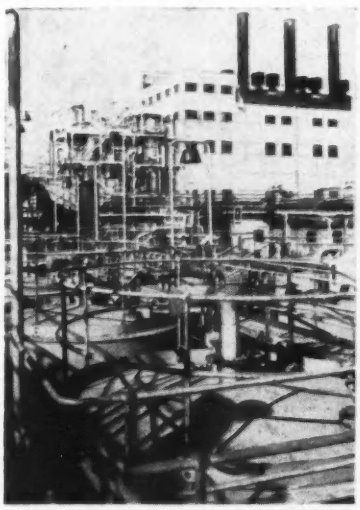
D.C.L. Process Used in New Phthalates Plant

Because of the rising demand for the Bisoflex range of plasticisers manufactured by **Distillers Co. Ltd.,** a need to increase production capacity for these phthalate esters has provided the opportunity for the company to build a further plant for their production at the Salt End, Hedon, factory.

The plant, commissioned in May this year, is based on a process developed by the company, in which reaction between phthalic anhydride and the appropriate alcohol takes place continuously. The most modern techniques are incorporated in the design of this continuous unit, which is fully integrated and has a high degree of instrumentation. Manual handling of raw material has been much reduced. Continuous monitoring of product quality ensures that material of a consistently high standard is produced.



Artist's impression of the new Warrington research block of Joseph Crosfield and Son



General view of the D.C.L. phthalates plant at Hedon

Riker Complete Further Phase In Expansion Programme

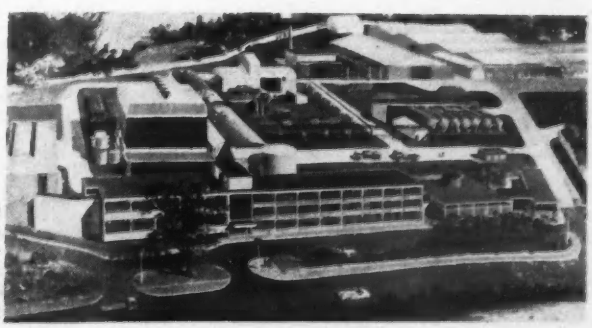
Riker Laboratories Ltd. have just completed another phase in their expansion programme by acquiring an additional factory in Loughborough. This is a single storey building and provides 20,000 sq. ft. of space. It houses all phases of tablet production and packaging, aerosol filling and packaging, gel and liquid filling and packaging.

Cost of the whole project is about £70,000. A further £15,000 to £20,000 will be spent in re-organisation of the space made available in the main factory in Morley Street, Loughborough. This will be used to provide additional office accommodation for the sales division and for extending the development and analytical laboratories.

Following the purchase early in the year of Carnegies of Welwyn Ltd., fine chemical production, now carried on in Loughborough, will be transferred to the Carnegie plant

New Headquarters for Fisons Pest Control

Now engaged in building a three-storey office and two-storey laboratory block (300 ft. frontage: floor area of 28,500 ft. super) are **Fisons Pest Control Ltd.,** at Harston, Cambridge. The 34 ft. high single-storey pilot plant building is of steel frame, and brickwork construction covering an area of 3,400 sq. ft. The new buildings will house the company's headquarters and will provide up-to-date facilities for their chemical development work.



Artist's impression of the Harston site of Fisons Pest Control. In the foreground is the administration block

CS_2 RECOVERY PIONEERED AT COURTAULDS' LANDMARK PROJECT

NOW in operation at one of the two production units at **Courtaulds'** Greenfield Works, Holywell, North Wales, where viscose rayon is produced, is a new £500,000 plant for recovery of substantial quantities of carbon disulphide. (In viscose rayon manufacture the two main gases evolved are H_2S and CS_2.) Known by the code name Landmark, the plant has been designed by Courtaulds' chemical engineers and the Engineering Division. It is a new development in CS_2 recovery and is believed to be the first large-scale unit to be installed in a rayon factory anywhere in the world; recovery of CS_2 is expected to total two-thirds of that used in the production unit.

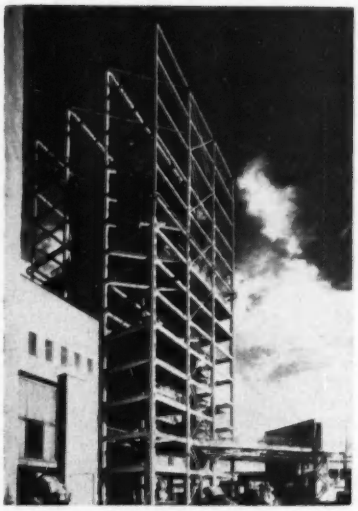
Research into the possibilities of recovering major quantities of CS_2 was intensified by Courtaulds 10 years ago. Laboratory scale investigations were followed in 1954-55 by the building of a medium-sized pilot plant at the company's Coventry rayon factory. The full-scale Landmark plant was authorised in 1957 and completed in May this year.

In the last four years Courtaulds have spent nearly £500,000 on fume scrubbing plant at Greenfield, excluding the Landmark plant. The new plant now works in conjunction with the fume absorption equipment installed for removing H_2S from the exhaust stream.

Main technical feature of the Landmark project is the use of large 'fluidised' active-carbon beds, for which CS_2 recovery is a new application. Courtaulds also believe that the new technique may be applied to recovery of solvent vapours from air or gas streams in other industries.

Landmark is a steel structure 170 ft. high containing a large vertical duct, an adsorber, a stripper/dryer and carbon circulating and regeneration systems. The CS_2 laden gas is blown up the large vertical duct into the adsorber where it fluidises several beds or layers of active carbon which adsorb the CS_2. The carbon is continuously moving across each tray and downwards from tray to tray into the stripper/dryer which removes the CS_2 by steam. The CS_2 is condensed and passed to a storage tank ready for returning to the viscose factory. The active-carbon continues to circulate back to the adsorber with a fixed proportion being separated for treatment to remove any minor impurities and then being returned to the circulation. The plant is continuous and fully automatic, incorporating extensive use of indicating and recording apparatus. Only two men per shift are required for supervision.

Scaling-up of the project proved to be a difficult chemical engineering task owing to the unusual nature of the process conditions. Volume and velocity of the gas and size and disposition of the fluidised beds required considerable investigation.



Courtaulds' Greenfield Landmark project during construction

Three Russian contracts that were announced in April, total about £15 million. These are: (a) machinery and plant for viscose rayon tyre cord factory; (b) machinery and plant for acrylic staple fibre factory; (c) machinery and plant for cellulose acetate yarn factory.

Courtaulds' agreement, through their subsidiary, Primex Ltd., provides, in some cases, for an exchange of developments for a period of some years.

Resources of Courtaulds' Engineering Division through Courtaulds' Technical Services Ltd., are now available to organisations outside the group. Among assignments accepted by this subsidiary is the design and supervision of construction of a large research laboratory at Lathom Park, Lancashire, for Pilkington Brothers, and a school of chemistry at Bristol University.

Lankro Chemicals Commission New Plant and Facilities

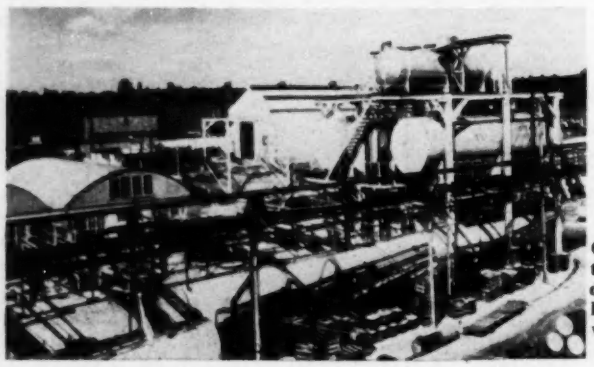
ON their site at Eccles, Manchester, **Lankro Chemicals Ltd.,** have commissioned new plant and facilities during the current year. The continuous neutralisation and washing plant for phthalate esters has been operating very satisfactorily since January, the company report. This unit which is controlled automatically was conceived primarily to obtain manufacturing economies by way of yield improvement and reduction in operating staff. A second object was a capacity increase of some 25%.

For manufacture of Lankro stabilisers for p.v.c. processing, which are of the organo-metallic type, new facilities have been constructed. The plant was commissioned in February.

In July storage and handling facilities for liquid phthalic anhydride were commissioned. These will eliminate inconvenience and losses associated with the handling of large quantities of solid phthalic anhydride. Final stages in construction of plant for the manufacture of ethylene and propylene oxide derivatives have been reached; it will be commissioned this month.

No main contractor has been employed in construction of the new plants and facilities, Lankro Chemicals taking direct responsibility for design and construction of their various projects.

The site at Eccles has recently been extended by the purchase of a neighbouring property and it is the company's intention to include new laboratories in their future development programme.



Overall view of the alkylene oxide derivatives plant of Lankro Chemicals, which is now nearing completion

Jeyes' Extension Projects

A new warehouse, an extension to the factory of **Jeyes' Sanitary Compounds Co. Ltd.,** at River Road, Barking, has been completed for the Jeyes' range, including antiseptics, disinfectants, and insecticides. Covering a total area of 18,000 sq. ft., 21 loading bays are provided. A new block of offices and laboratories will form an extension to the existing factory at Plaistow and will enable further expansion and reconstruction to be initiated. Construction is due to start in October and should be completed by the end of June 1960.

Contract News

BUSY YEAR FOR POWER-GAS WITH WORK AT HOME AND OVERSEAS

AMONG several interesting orders placed with the **Power-Gas Corporation Ltd.**, Stockton-on-Tees, this year has been one for two units of venturi scrubbers to treat gases from zinc sintering machines at the Swansea Works of the National Smelting Co.

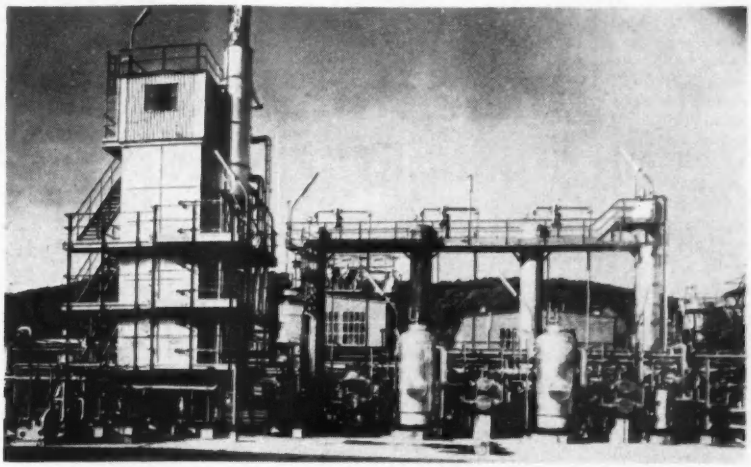
Abroad, the company has received contracts which included the engineering of Krystal plant for the production of ammonium sulphate in Turkey, dust removal plant of the bag filter type for the Eastern Smelting Co. Ltd., Malaya, and orders for several small vertical shaft lime kilns for India. Catalyst of the high- and low-pressure types has been ordered for plants in the U.K. and on the Continent.

For African Explosives and Chemical Industries Ltd. at Modderfontein, Power-Gas are carrying out the detailed engineering, supply and erection of the extensions to the gas purification sections of the existing plant in accordance with basic design data supplied by A.E. and C.I. and I.C.I., Billingham Division. These extensions include CO conversion at low pressure, CO_2 removal and recovery using water wash, and high pressure CO removal by copper liquor wash followed by a final purification. Modifications and extensions to the gasification section are being carried out by Ashmore, Benson, Pease and Co. Africa (Pty.) Ltd. to Power-Gas designs. (See also photo p. 398.)

Among plants completed in 1959 are the following: A Power-Gas/Hercules reforming plant at Bad-Hoeningen for Kali-Chemie AG, Hanover, based on liquid hydrocarbon feedstock and comprising a tubular cracking furnace followed by CO conversion, CO_2 removal and a methanation stage to produce a very high purity hydrogen. In Belgium, for Carbochimique S.A., the company has engineered a Texaco plant producing synthesis gas for ammonia from heavy oil. The plant, which includes a high pressure CO conversion unit, has a daily capacity equivalent to 100/150 tons NH_3. In Germany, a Krystal triple effect plant to produce 150 tons/day of ammonium sulphate has been designed, supplied and installed for Stickstoff-Werk Krefeld GmbH.

A sulphuric acid plant has been set to work for the Associated Chemical Companies Group at their Eaglescliffe Works. The plant has been commissioned and tests have shown a high overall efficiency. Rated capacity is 100 tons/day, but the plant is capable of working at an overload if required. The production acid can be delivered at various strengths up to 98.6%.

In the plant and equipment field, Power-Gas are now marketing vertical shaft lime kilns fired by oil. In addition to their range of mixed feed and gas fired shaft kilns for the production of burnt lime, caustic or sintered dolomite and magnesite, etc. A newly developed high pressure nitric acid process which is self-supporting in power is now offered and the company has been licensed to offer the Giammarco-Vetrocoke process for acid gas removal.



Power-Gas/Hercules reforming plant at Bad-Hoeningen for Kali-Chemie AG

Research Reactor Contracts for H.W.P.

AMONG projects by **Head Wrightson Processes Ltd.**, 24-26 Baltic Street, London E.C.1, are the Carrington ethylene plant (30,000 tons/year) of Petrochemicals Ltd.; a complete installation of Dido-type heavy water research reactor for the Australian Atomic Energy Commission at Lucas Heights; a similar installation for the North Rhine Westphalian Nuclear Research Station; and a complete installation of a Pluto-type heavy water research reactor for the Danish Atomic Energy Commission at Riso.

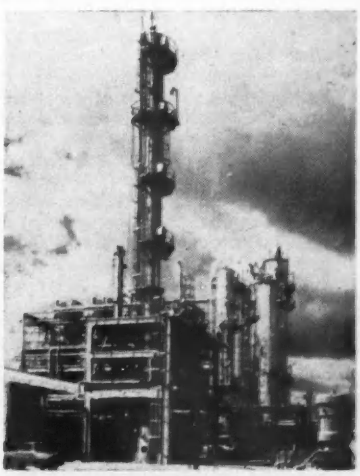
On process design and construction, the company have, with their wide association with leading U.S. and continental operational and research organisations, considerably extended their ability to carry out complete design and engineering of petroleum and petrochemical plants. In particular, is their recent association with A. G. McKee Corporation of Cleveland, Ohio.

The HW/Fluor 'Counterflo' cooling towers with induced draught have maintained their popularity and are now manufactured of pre-stressed concrete construction, in addition to the conventional timber construction. In addition they have entered the natural draught cooling tower field and now design and supply these large concrete towers.

A recent development in packings for cooling towers is being produced after extended tests and large sales have already been made of Poly-Grid plastic packings (see CHEMICAL AGE, 30 August).

Another innovation is the H.W. 'Compact' gantry which has recently been designed and patented by Head Wrightson. HW/Fluor 'Fin Fan' air cooled heat exchangers have been a subject of much research and are now being more extensively used on all process operations and where water is scarce and expensive, are in many cases essential.

The company have designed and supplied the largest air-cooled heat exchanger in Europe and to the best of their knowledge, in the world, for the Esso Refinery at Fawley.

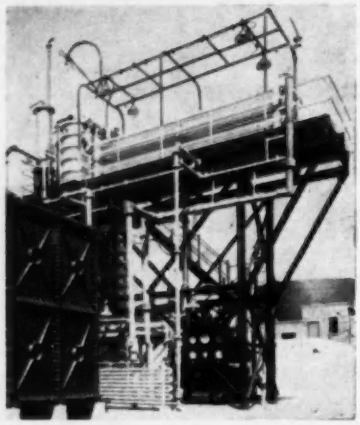


Ethylene (direct oxidation) plant at the Carrington Works, near Manchester, of Shell Chemical Co.

Contract News

R. & J. DEMPSTER'S PROGRESS IN 'TURNKEY' PROJECTS

ALTHOUGH R. and J. Dempster Ltd., Manchester, have roots in the gas and coking industries they are fast becoming one of the chemical plant suppliers who can design, engineer and fabricate complete projects in their own works. Full facilities for the manufacture of vessels to all codes now exist and the



Concentrated ammoniacal liquor plant installed by R. and J. Dempster

end of 1959 will see the re-orientation of one shop to allow the building of multi-plate fractionating column shells in one piece and the opening of a new shop for stainless steel work.

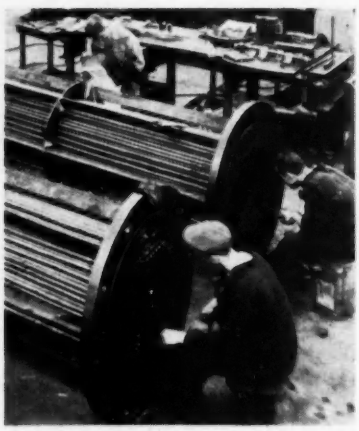
Complementary to the modernisation of the works has been the setting up of an active team of chemical engineers and comprehensive drawing and design offices. With a contracts department co-ordinating the activities of the works and technical departments with the erection and engineering on site, complete plants are supplied from the bare site to turnkey stages.

Today, many of the conventional plants used traditionally on gas and coking plants are designed by modern design methods applicable to chemical engineering generally and Dempster's have many examples working to critical standards. For instance, the company is now building a holder using prefabrication methods, in that large panels are welded on a jig at ground level and raised into position as completed.

Absorption plants for the removal of ammonia, naphthalene and benzole from fuel gases are now installed to strict standards. One such plant now under construction will remove benzole and homologues from coal-gas and the circulating absorption oil has been increased to allow removal of most of the organic sulphur, largely carbon disulphide. The gas is washed in a 90 ft. tower scrubber, packed with boards on edge, at a rate of the order of 22,000 gall. per hour. The enriched oil is stripped in conventional bubble cup columns under vacuum conditions and particular attention has been paid to heat recuperation in order to save steam.

Dempster's modern tray purifiers meet the requirement that hydrogen sulphide in fuel gases should be as low as 0.7 p.p.m., and by virtue of the ease with which the trays containing iron oxide may be removed by the 20-ton overhead crane and hydraulic operation of valves, conditions for the men and the overall efficiency are greatly improved over earlier installations.

A liquid purification plant of low capital and running cost is now being studied by the research and development department and it is expected that the usual difficulties associated with this type



Working on heat exchangers in R. and J. Dempster's workshops for a Cadishead still of Lancashire Tar Distillers

of plant will be overcome and that the plant will produce pure sulphur while continuously removing hydrogen sulphide from the gas without breakdown. Air and aqueous effluent would be absent and the cost of reagent commensurate with the economic balance of the process.

A batch distillation plant for benzole recovery and refining is now almost completed and will be employed for the production of a range of solvents from a hydrorefined naphtha feedstock. The fractionating column is some 90 ft. high and incorporates bubble hood plates of special design for low pressure drop and hold-up values. The plant will work from atmospheric to almost complete vacuum conditions over the period of distillation and will require little manual control.

Building of laboratory scale continuous distillation columns has greatly aided the evaluation of operating data and represents an essential feature of the routine approach to design.

Newton Chambers Install Tower Purifiers for E.M.G.B.

SEVERAL important contracts in the chemical industry field have been received by **Newton Chambers and Co. Ltd.**, Thorncliffe, Sheffield. From the East Midlands Gas Board, they have a contract to build a set of tower purifiers for the removal of H_2S to statutory limits from coke oven gas, using the conventional iron oxide process. In addition to the Newton Chambers mechanical oxide discharger, this installation will be provided with an automatic operator to promote rapid sequence rotation of the towers. This will be the first installation of its kind to be so equipped.

Another contract in the field of gas purification is that which Newton Chambers have in hand for Humphries and Glasgow Ltd. (main contractors to the Scottish Gas Board), for an installation of tower purifiers for the Westfield Lurgi gasification project. This is the first installation of its kind in Britain and will be constructed under the licence arrangement which Newton Chambers have with Bischoff, Essen, whereby they acquired the exclusive right to build these purifiers and other specialist plant in Britain.

As a further development of the process for the hydrorefining of crude benzoles—with a particular view to producing pure products from the hydrorefined spirit—Newton Chambers, with the Coal Tar Research Association and Bnezole Producers Ltd., have proved a cryoscopic method for producing pure benzene in practically theoretical yield without the need for extensive fractionation equipment and from almost any type of graded benzole.

During the past year Newton Chambers have begun the manufacture and sale, under a licence agreement with the Struthers Wells Corporation, Warren, Penn., U.S., of fired heaters of all types both for direct heating process liquids and gases and for indirect process heating using Dowtherm and similar heat transfer media. Recently they have also reached an agreement with Struthers Wells to manufacture their range of standard tube-in-shell heat exchangers.

Carbide Industries Plant at Maydown

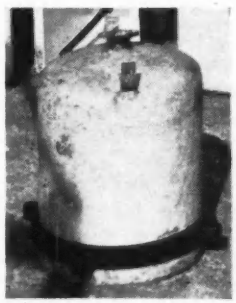
Model of Carbide Industries' Maydown plant for calcium carbide and acetylene

Contract News

KESTNER GAIN CONTRACTS FOR LARGE-SCALE PLANTS

DURING the last year, **Kestner Evaporator and Engineering Co. Ltd.,** 5 Grosvenor Gardens, London S.W.1, have gained important contracts from the U.K. and overseas for design and construction of large-scale plants, have introduced an additional range of Keeglas, and have designed and manufactured new pumps, stirrers and other equipment for the chemical industry

Kestner have completed an order for Courtaulds for two Kestner high vacuum



Domed top vessel in Keeglas for sulphuric acid at a working pressure of 25 p.s.i.

continuous crystallisers dealing with many tons of Glauber's salt per 24 hours from rayon spinning bath liquor. Materials of construction include a high proportion of Keebush, with other parts in rubber and lead-lined steel.

Other home contracts of special interest have been for metalliferous plants such as Associated Lead Manufacturers Ltd., Ford's, General Electric Co., etc., some of them for large scale pickling plants and others for lesser duties.

The Associated Lead installations (there are four in all) are concerned with lithium and its salts, and for concentrating lithium sulphate. The second pair of these which may be regarded as falling within the last year are: a forced circulating salting climbing film evaporator with twin calandrias and a double effect climbing and falling film non vacuum evaporator concentrating lithium sulphate.

At Ford's, Dagenham, plant is being installed for drying moulding sand and will provide an extension to existing Kestner plant there, raising total throughput from seven tons per hour to 27. The contract is for two Kestner Thermo-Venturi driers cast iron and heavy plate mild steel. The moisture content of the dried sand is brought down to 0.3%.

Among the overseas contracts are a large spraying plant for sodium sulphate obtained through V/O Techmashimport of Moscow for the U.S.S.R., and plant for spinning bath acid recovery for Travancore Rayons Ltd., India.

Introduction of an additional range of Keeglas, which in some ways may be regarded as a follow-up of Keebush, utilises new constructional materials with new properties. Two standard grades have been developed and used for chemical plant, Keeglas E and Keeglas F, plus special grades. Glass fibre bonded with various of the newer resins is used. Pipes, tanks and reactor vessels are all being manufactured from it.

Two new ranges of acid pump have been designed and introduced. A horizontal one which has a specially rigid cast iron bearing assembly of robust construction, having no pockets in which corrosives can collect. Bearings are totally enclosed and shafts are generously sized. Design allows for maximum interchangeability between contact materials, Keebush, lead, etc. The other is a vertical glandless axial flow type (Type H) intended primarily for circulating rayon spinning bath liquor and for forced circulation evaporators handling caustic soda. One model can handle up to 3,300 g.p.m.

The company has also designed and developed the Kestner spray-type sulphur burner, consisting essentially of a specially designed atomiser and combustion chamber, generating sulphur dioxide at high concentration.

Acid-resistant Linings for Effluent Tanks at Ruabon Works

EXPANSION at Ruabon Works of Monsanto Chemicals has called for the construction of a further effluent holding tank of 250,000 gall. capacity. **Semtex Ltd.,** 19-20 Berners Street, London W.1, have been asked to install a lining similar to those fitted about five years ago to two other holding tanks, the acid-resisting linings having proved entirely satisfactory. The specification is for 4½ in. thick acid-resisting bricks set in latex/cement over a membrane of latex/cement.

Semtex are to install acid-resisting brick and tile linings bedded and jointed in acid-resisting cement in the copperas reception hoppers, alum storage tanks, copperas solution storage tanks, etc., at the Arnfield Treatment plant of Manchester Waterworks.

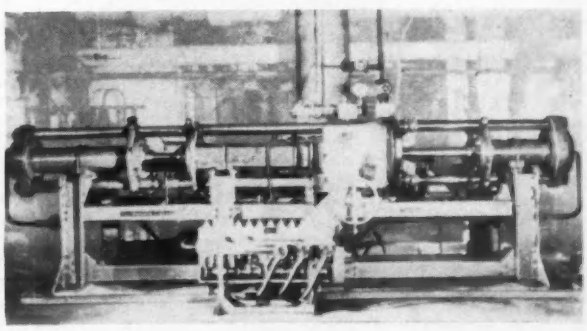
Another interesting contract has been the supply of 315 sq. yd. of Gripdec surfacing for a steel deck lift bridge for the Port of London Authority. Gripdec is a flexible covering made from a balanced blend of chemical rubber, resinous compound and a non-slip mineral filler. It is immune to the effects of solvents, grease and oil, is dimensionally stable and does not deteriorate as a result of rapid temperature changes.

Compressor Unit for Polythene

THE most important contract completed by **Lloyd and Ross Ltd.,** 58 Victoria Street, London S.W.1, has been the complete compressor plant for the production of polythene at Fawley. This has involved the supply of compressors for the by-product ethylene gas up to final compression pressures of the order of 2,000 atmospheres. Several similar plants have also been supplied to other countries.

Hydrogen compressors have been completed for chlorine works in this country, and a repeat order has been received for a large carbon dioxide compressor for Australia for operation in connection with solid carbon dioxide presses. An interesting dual fuel-CO_2 plant was completed at the end of last year for the production of liquid and solid CO_2 for West Africa and under contract are a number of small oil-fired liquid CO_2 plants for the Middle and Far East. One plant installed in the Far East produces about 10 tons a day of dry ice from oil fuel. A bulk storage tank for liquid CO_2 has also been installed which is fitted with high pressure cylinder filling equipment for production of practically pure liquid CO_2. Such tanks can be supplied in capacities up to 50 tons.

Development of the CO_2 plants using a minimum quantity of fresh water has played a large part in the success of these new plants, Lloyd and Ross say.

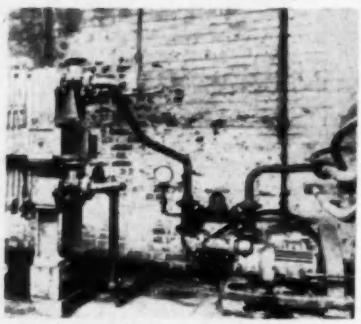


Fully - automatic dry ice press by Lloyd - Ross in which snowing and production takes place simultaneously is seen in use in a large ammonia synthesis plant

Trends in Plant and Equipment

Mono Pumps Service Williams' Modern Dyestuffs Factory

A BATCH of Mono pumps manufactured by **Mono Pumps Ltd.**, Mono House, Sekforde Street, Clerkenwell, London E.C.1, is used at the dyestuffs factory of Williams (Hounslow) Ltd., for transfer from stage to stage of production or for delivering to filter presses. In the intermediary stage of production,



Ebonite-lined D70 Mono pump with Langalloy 4R rotor and shaft in the dyestuffs plant of Williams (Hounslow) Ltd. Pins and pin caps of the universal coupling are of Corronel B. The pump runs at 320 r.p.m. for a rated capacity of 1,000 g.p.h. and delivers a thick suspension containing sodium chloride and hydrochloric acid to a filter press at a maximum pressure of 40 p.s.i.

three D60 ebonite lined pumps with stainless steel rotating parts receive a thin suspension of slurry at 80°C to deliver to filters at a maximum pressure of 40 p.s.i. The filtrate is then gravity fed to receiving vessels and two further D60 Mono pumps transfer the fluid 30 ft. to the top floor for fine filtration. After further processing the colour, now a thick suspension in brine at 80°C, is delivered to filter colour presses at a maximum pressure of 40 p.s.i.

Absolute purity and cleanliness is required throughout all production stages and the Mono pumps are required to maintain the production cycle in conformity with the flow rate.

Mono pumps are also used in other departments where different dyestuff compounds are produced. There are D60 and D70 models feeding filters with a suspension of dyestuffs in sodium chloride and hydrochloric acid. These are ebonite lined pumps fitted with a Langalloy 4R rotor with shafts, pins and joints in corronel B. Stators are of SN grade. The D70 Mono pump handles a thick suspension and operates at a speed of 320 r.p.m. to provide a rated capacity of 1,000 g.p.h. The D60 pump is handling a thin suspension and runs at 720 r.p.m. for a rated capacity of 1,100 g.p.h.

Controlled Mixing by Mulling

To meet the trend towards greater mulling pressures with a minimum of muller inertia, **August's Ltd.**, Halifax, have introduced a special large size August-Simpson Mix-Muller (weighing approximately 13 tons). It is designed to work under vacuum and is jacketed on the bottom, side and top cover of the mixing pan for heating by steam. This type of machine, August's report, has been sold to the chemical and allied industries and in the atomic field. When moisture has to be removed under vacuum considerable economies may be achieved with this unit, it is indicated, by virtue of reduced handling charges. One company using a No. 3 Mix-Muller has reported an annual saving of over £3,000 due to the uniform dispersion of a bonding agent.

The Mix-Muller consists of a circular, stationary pan in which is mounted a special combination of plows and mullers. The mullers revolve and the plows exert a 'shovelling' action to the material being mixed. The mullers are adjustable and are mounted on rocker arms so that they are free to 'float' on the material being mixed—creating pressure and an intensive rubbing and smearing action as they revolve, yet without causing actual grinding. Liquids may be added through a funnel mounted in the centre, without contacting any other part of the Mix-Muller.

Karbate Graphite

Claimed to offer striking economies in the removal of entrained liquid from gas streams, particularly when corrosive liquid or gas conditions exist, are Karbate impervious graphite entrainment separators Tye MV., made by **British Acheson Electrodes Ltd.**, Grange Mill Lane, Wincobank, Sheffield. They contain no moving parts and are non-clogging. Gas pressure drops through type MV separators are low. Six standard sizes fit directly into pipelines from 6 in. to 24 in. in diameter. They have immunity to corrosion over a temperature range from −40°F to 338°F. Also available are modules measuring 12 in. by 24 in. which can be assembled into larger units.

A type MV 8 in. Karbate separator can handle 4,000 lb./hr. HCl gas at 15 p.s.i.g. when used to produce anhydrous HCl gas. A 16 in. Karbate separator can handle 4,000 lb./hr. water vapour at 3 m. Hg. ats. Vapours may carry sulphuric acid mist plus about 4 lb./hr. of sticky TiO_2 pigment. To rinse off the pigment 1 to 2 GFM water is sprayed into the vapours as they enter the separator. Nearly complete recovery of the entrainment can be accomplished amounting to 20 cents/hour for the pigment alone, or about one year to pay for the separator.

In chlorination increased reactor yields are claimed due to increased recovery of organic material from HCl off-gas, using a type MV entrainment separator. In a camphene chlorinator, several gallons of carbon tetrachloride have been recovered in a few hours of operation, the HCl being sewered. Karbate separator, 6 in., can handle 600 lb./hr. HCl gas at 5 p.s.i.g., 36 gall. of toluene being recovered in five days. Load is reduced also on actuated carbon used to purify the hydrochloric acid.

Mineral Filter Aid

A new unit, scheduled to go into production this month, is announced by the **British Ceca Co. Ltd.**, 175 Piccadilly, London W.1. It is for the production of expanded high-grade mineral filter aid and is the first of its type in the U.K. It is also claimed to be the first unit to produce any type of high-grade filter aid indigenously. The plant is installed at the company's Strood, Rochester, works.

Germanium Rectifiers for Electrolytic Duty

Electrical plant made by A.E.I. Heavy Plant Division of **British Thomson-Houston Co. Ltd.**, Rugby, for use in the chemical industry includes equipment for the distribution, rectification and utilisation of electricity. Particular reference is made here, however, to germanium rectifier equipments supplied in recent times by the A.E.I. Heavy Plant Division for electrolytic work—a duty for which the high efficiency and reliability of these rectifiers are of particular significance.

Among the most important commissionings recently have been the 80,000 amp., 230-volt installation for the Associated Ethyl Co. Ltd. and a 13,000-amp, 150-volt equipment supplied for copper refining in Central Africa. Numerous other orders have been received including an order for two 11,250-amp., 678/562-volt equipments for the Electrolytic Zinc Co. of Australasia Ltd.

It is interesting to note A.E.I. report that, in spite of the comparatively high d.c. voltage, germanium rectifiers proved more acceptable than mercury-arc rectifiers for this installation. The successful operating record of large germanium rectifiers recently commissioned by A.E.I. is considered to have played an important part in this decision.

New Heat Exchangers for Chemical Industry

During the past year, **Brown Fintube (Gt. Britain) Ltd.**, of Birmingham, have introduced several new items of extended surface heat exchange equipment for the chemical and petroleum industries. Among these are a combination tube and shell and double pipe exchanger, containing seven tubes in a 4 in. dia. shell, and a modified exchanger for low pressures. In addition the use of internally finned tube has been increased.

Seven Tube Unit.—For large heat transfer duties in excess of 3-4,000,000 B.Th.U./hr. the number of double pipe exchangers required to give the necessary

heat transfer surface has in the past rendered this type of exchanger uneconomic. To overcome this, a combination of double pipe and shell and tube exchanger has been introduced. In this exchanger, the single internal finned pipe is replaced by seven small diameter removable finned tubes. These are attached to a tube plate and from this a reducer leads to the vertical type of Brown Fintube closure. Use of seven small finned tubes greatly increases the effective area, and with this design Brown Fintube units have proved economical for applications in excess of 10,000,000 B.Th.U./hr., it is reported.

Modified Closures.—The standard Brown Fintube design of closure was originally developed for the petroleum industry, and the lowest pressure rating (600 p.s.i.) is considerably too high for some applications in the chemical industry. A simplified form of closure has been developed, which, while it gives the same tube removal facilities as the previous design, is much cheaper in first cost.

Aeration Blending of Dry Pulverised Materials

Specially designed to meet the need of industry for a system that can efficiently blend dry pulverised materials on a commercial scale is the Fuller Airmerge system, developed by the Fuller Co., Catasauqua, Pennsylvania, U.S., and manufactured under licence by **Constantin (Engineers) Ltd.**, 123 Victoria Street, London S.W.1.

Advantages claimed for the Airmerge system are: thorough homogenisation even when the blended materials differ in bulk density and fineness; high capacity in tonnage throughput in a site of moderate size; high capacity in tons per hour leading to a saving in man hours per ton; and economy in kWh per ton of blended product.

To effect blending, compressed air is led into a quarter section of a silo in a volume sufficient to fluidise fully the material above that individual section. As a result of being expanded and at the same time becoming fluid, this material rises above the level of the adjacent quadrants and flows out across them at a rapid rate, running off at a slope of 2 to 5 degrees. At the bottoms of the temporarily inactive quadrants, a small amount of compressed air is released, just enough to make the material 'mushy' but without much change from its unaerated bulk density.

A strong and continuous roll-over motion in a typical circuit is obtained, which results in an intensive and thorough mixing of the silo contents from top to bottom and throughout the active quadrant. The intensive aeration is periodically switched to a previously inactive adjacent quadrant, and then successively to each of the quadrants in rotation. Two circuits of the silo bottom will generally result in a perfectly blended material, it is reported.

In the case of materials which do not respond to steady air application, fluidisation can be effected by pulsation. The combination of quadrant blending with pulsated application of the blending air comprises the Fuller Airmerge system. Material with a variation of plus or minus 2% in any given chemical component may be fed into the silo, and after blending, will emerge with a variation in the same chemical component of plus or minus 2/10 of 1%, or better.

Dewrance Safety Valves and Pressure Gauges

Dewrance consolidated safety relief valves and pressure gauges have been supplied, **Dewrance and Co. Ltd.**, Great Dover Street, London S.E.1, inform us, to Stone and Webster Engineering Ltd. for British Hydrocarbon Chemicals' No. 3 ethylene unit at Grangemouth. Safety relief valves and new design 58 Series pressure gauges have also been supplied to Stone and Webster for Sincat's C_4 heating unit at Priolo, Sicily. Kellogg International have used these safety valves for I.C.I.'s reforming unit at Heysham and for Petrochemicals Ltd.'s ethylene 11 unit at Carrington, together with Duragauges.

Hydraulic Jet Cleaner

With the C.P.-Sellers hydraulic cleaning equipment, manufactured under exclusive licence from the Sellers Injector Corporation of America, by **C.P. Equipment Ltd.**, Mill Green Road, Mitcham, Surrey, it is claimed that cleaning operations previously requiring hours of manual labour have been reduced to a fraction of the time.

The units use steam and cold water only and produce a jet of hot, high-pressure water (2½ times steam supply pressure) which provides a powerful hydraulic scrubbing action. This jet is applied either through a hand lance in conjunction with a suitable nozzle from a wide range available for specific cleaning operations or for enclosed tanks through a rotor jet unit. This enables tanks to be cleaned entirely from the outside.

The Chemo jet cleaner provides the two steps necessary for removal of encrusted matter, such as resins, smokehouse deposits, and similar adhesive soil. It propels, through separate hoses, (1) a spray stream of hot chemical concentrate at 160 g.p.h. that pre-sprays stubborn matter and breaks it down for (2) removal by a large volume solid jet of high-pressure hot water. The hot water section is a standard model B. jet. Both sections operate on 50 p.s.i. steam upward. The chemical section is furnished with 50 ft. ¼-in. high-pressure hose, Chemo cleaning lance and two all-purpose nozzles with interchangeable discs.

Rotary Louvre Drying and Cooling Equipment

A highly efficient method of processing very fine materials has been developed by **Dunford and Elliott Process Engineering Ltd.**, Lindford Street, London S.W.8, manufacturers of rotary louvre drying and cooling equipment. The rotary louvre principle has not been fully satisfactory for treating very fine materials as the speed of the heating or cooling air has previously had to be limited in accordance with the fineness of the material being processed.

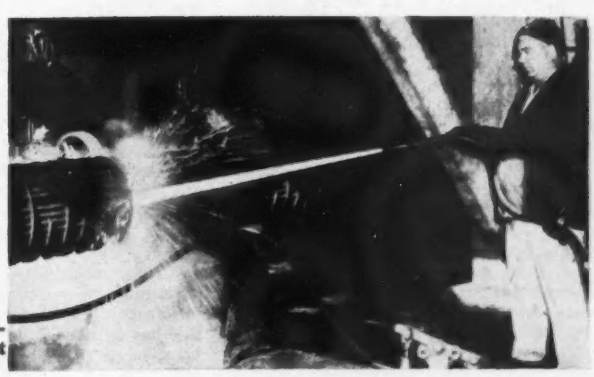
The new system of operation prevents the carrying away of fine materials by eliminating the current of air and effecting the heat transfer by heating or cooling sections of the internal louvres before they enter the bed of the material. When heating, a flame, or alternatively hot air, is applied directly to a number of louvres which in turn rapidly transfer their heat to the material. When cooling, sections of the louvres cooled by air successively extract the heat from the hot material.

Dunford and Elliott report that this method has been used with great success in a number of applications, two typical ones being the drying of black iron oxide filter cake in which the moisture content was reduced from 25% to 0.1% and the processing of a catalyst based on diatomaceous earth in very fine powder form. In this latter case the moisture content was reduced from 6.6% to 0%, the maximum temperature which the material reached during processing being 400°C.

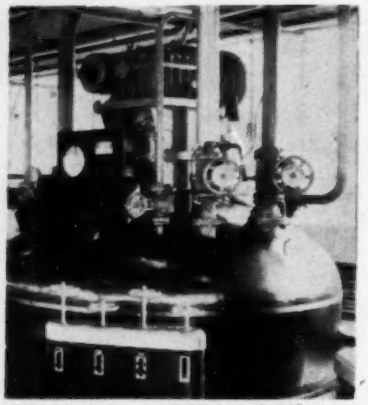
Raising Polythene Output With Larger Motors

Chemical plant erected recently in which equipment from the **English Electric Co. Ltd.**, Stafford, plays a part, includes the polythene plant at Grangemouth, operated as a subsidiary company of the Union Carbide Corp. of America by Gemec Ltd. In April this year the Union Carbide Corp. announced their decision to double the size of the Grangemouth plant. Output will be stepped up from an annual value of £30 million to £60 million by 1960.

It was found by increasing the size



C.P. - Sellers hydraulic steam jet in use



One of a group of 30 h.p. 1,465 r.p.m. English Electric enclosed weatherproof squirrel-cage chemical-type motors seen driving hardening vessel agitators through Wiseman gears at the Stork Margarine Works, Purfleet

of the compressor drive motors, that output could be greatly increased. The new motors, of which there are four, are of the salient pole synchronous drip proof type rated at 1,000 h.p., 750 r.p.m. equipped with two end bracket pedestal mounted bearings.

Induction motors installed in the Stork Margarine Works, Purfleet, of Van den Berghs, are protected against corrosion and Group IV gases. Totally enclosed motors are used and operated in locations where hydrogen is used. Arrangements are made for the internal parts of each motor to be pressurised by supplying clean air through the conduit and terminal box.

To ensure that pressure is maintained, each motor has an intrinsically safe pressure sensitive relay, which, in the event of air supply failure will stop the motor. A visual indicator showing that pressure is maintained is by means of a gauge and bubble-type flow indicator.

Stainless Steel in the Chemical Industry

The weld neck flange, produced by the Centrispinning foundry of **Firth-Vickers Stainless Steels Ltd.**, Sheffield, is being supplied in increasing numbers to the British chemical industry. Centrispinning is performed by pouring liquid metal into a rapidly rotating mould and continuing the rotation until the metal has solidified under pressure. Various spinning techniques have been developed for the production of a wide variety of sections. Rotation of the mould may be about a vertical or horizontal axis and either refractory moulds or metal dies may be used. Depending on the process used, the size may vary from 5 in. to 6 ft. in diameter, and the weight up to four tons gross.

Components produced by the centrispinning process are stated to have several advantages over those produced by the most advanced static casting processes, e.g., homogeneous structure with a high degree of cleanliness, uniform maximum strength at all points and in all directions, freedom from defects of all types. In many cases where the shape of the component or the design enables a permanent metal mould to be employed, the cost of moulding as in conventional methods is avoided. This frequently leads to economies over other methods of manufacture.

Gwynnes Pumps for Chemical Projects

Supplying a number of pumps to the chemical industry are **Gwynnes Pumps Ltd.**, Hammersmith, London W.6. These range from standard water pumps to special pumps for handling chemicals of various types. In the past year Gwynnes have supplied a number of pumps through Ashmore, Benson, Pease and Co. Ltd. for the Rutherglen Works of British Chrome and Chemicals Co. These pumps are of the horizontal volute mixed flow type having 18 in. suction and delivery branches. Three of these pumps are for handling 300 litres per second of sodium dichromate with a concentration varying between 41.5% and 81.5% at a temperature up to 120°C. The fourth pump at the same works is of similar design, delivering 250 litres per second of sodium chromate.

Also for Ashmore, Benson, Pease and Co., Gwynnes are supplying special stainless steel pumps for use in connection with their Krystal process.

Spiral Jacketed Vessels

In hand by **Giusti and Son Ltd.**, Belle Isle Works, 210-212 York Way, Kings Cross, London N.7, are several chemical plant projects for the home and overseas markets. The company's reaction vessels with rectangular section spiral coils introduced at last year's Chemical and Petroleum Engineering Exhibition has been the subject of many inquiries, it is reported, and a number are currently being manufactured at Giusti's workshops.

Spiral jacketed vessels have been found to be particularly suitable for circulation of organic heat transfer media and for cooling by water circulation as the surface speeds of circulating media are fast and the reduced metal thicknesses assist the heat transfer.

H.W.P. 'Com-Pact' Gantry

As designers and suppliers of water cooling towers, etc., **Head Wrightson Processes Ltd.** have always considered that, as a result of their development and research work, any improvement or aids to efficiency and economical operation should be passed to their clients, and with this in view offer the Com-Pact gantry. (Conserve on Maintenance—Portable Adjustable Cooling Tower.)

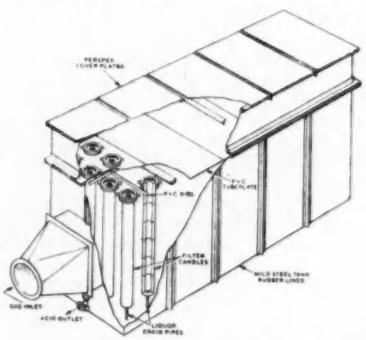
Removal of the induced draught fan and fan drive gearbox for inspection and maintenance necessitates rigging up suitable tackle entailing much labour, time and delay in bringing the tower back into service, and to reduce these losses the H.W.P. Com-Pact gantry has been designed.

An essential feature is the ability to manhandle the various components to the fan deck of the tower for assembly and this has been done by making the main beam in short sections. Each beam section is of deep, braced dual box construction which can be built up into a rigid long beam of suitable span to clear the fan stack, with joints having a wide bearing face to eliminate any deflection under load.

New Fibre Filter for Acid Mists and Fumes

An extensive programme of research by C. Lowrie Fairs of I.C.I. General Chemicals Division has led to a new fibre filter that is said virtually to eliminate the emission of very fine acid mist particles from the tail gases of major acid producing plant. **Mancuna Engineering Ltd.**, Denton, Manchester, have been granted a manufacturing and selling licence for the filter (trade name Mancuna-Mistex) and are currently engaged in the detailed design of standard units and components. An irrigated form will be known as the Mancuna-Fumex.

The exceptional efficiency of filtration achieved is due to the employment as the filter medium of fine diameter fibres which possess hydrophobic characteristics. This results in the impingement on the fibres of discrete droplets of very fine liquid particles and in a very free dispersion and drainage of liquid through the mass of fibre. Experimental work has been carried out primarily with glass fibre and Terylene.



Cutaway diagram of the new fibre filter unit

The filters have been extensively tested at pilot plant stage in the elimination of mist from gases containing fine sulphuric acid mist. The performance where the acid mist comprises droplets which are 100% below two microns has been such that an inlet concentration of 0.1 g. H_2SO_4/M^3 has been reduced to an emission to atmosphere of a mist concentration of 0.0005/0.007 g. H_2SO_4/M^3. A novel and significant feature of this equipment is that the emission of mists from the outlet of the filter does not increase where there is a temporary or fluctuating increase in the inlet concentration.

The unit illustrated comprises an assembly of blocks of standard filter candles each consisting of six 10 in. long elements sealed together to form one composite candle. Inclusive of the steel tank and top outlet chamber the unit will stand approximately 6 ft. high, though some 13 ft. of headroom will be necessary to permit the withdrawal of the candles for any necessary servicing or replacement. It is intended that units

should be introduced into existing plant through ducts which will incorporate 'U' bends which can be used as individual water seals. Liquid removed from the gas discharges down the centre core of the candle and is removed from the tank through a simple acid outlet.

It is anticipated that one candle of six elements with a 10 in. w.g. pressure drop will handle some 200 cu. ft./air/min. A period of up to 24 hours is required from the start up of the filter before maximum efficiency is achieved owing to the necessity to build up an adequate liquor content of the fibres.

Application of the irrigated form of the fibre filter will permit the recovery of mists where the acid concentration would normally be such as to damage the filter medium.

Hurrell Homegeniser

It is three years since **G. C. Hurrell and Co. Ltd.**, Knight Road, Strood, Rochester, Kent, left their old works at Charlton, London S.E., and moved to their new factory at Rochester. The works were built to their own design.

The principal item of manufacture continues to be the Hurrell homogeniser or colloid mill and while numbers of these are supplied to firms in the chemical, dyestuff, pharmaceutical and foodstuff industry, the largest part of output consists of their homogenisers, forming part of ensembles with metering pumps and other ancillaries for the continuous production of bituminous emulsion at rates of 5, 10 or 15 tons per hour.

Altoflux Flowmeters

Altoflux flowmeters were developed by the sister company in Holland of **Auto Instruments (Great Britain) Ltd.**, Maxwell House, Arundel Street, London W.C.2, some eight or nine years ago. Production has now been begun in this country on a redesigned instrument. Increasing sales to the chemical industry are reported.

This flowmeter consists of a detector unit, amplifier and suitable indicating, recording or integrating instruments. It can be used in conjunction with practically any potentiometric recorder, and special adapter units are available for all the well-known makes of potentiometers. The detector consists of a non-magnetic tube, normally lined with electrical insulating material and having two small electrodes sealed in flush with its interior surface. Coil bindings, mounted on the outside of the tube, provide the magnetic field through which passes the fluid to be metered. The unit is housed in a robust drip-proof metal case. Flame proof enclosure is also under development. Inert linings render Altoflux flowmeters suitable for handling the most aggressive fluids, it is stated. Slurries, pastes and solids in suspension are also easily handled.

Vertical Inverted Autoclaves

Well equipped to produce a wide range of pressure both in mild steel and stainless steel are the **Leeds and Bradford Boiler Co. Ltd.**, Stanningley, nr. Leeds. Special lines are autoclaves fitted with a full-sized quick opening door at one or both ends. This Quicklock patent safety door has a unique range of patent safety devices to go with it.

The autoclaves may be filled with steam after being charged, or with compressed air with heat supplied by coils or a jacket. Besides the horizontal style vessel there is the vertical type. This latter usually has the door at the top but Leeds and Bradford have found recently two or three uses for vertical vessels with the door at the bottom and arranged so that the shell lifts out of the way. The advantage of this arrangement is that goods can run into the working space and out again on rails, thus eliminating handling.

Up to now these vertical inverted vessels have been comparatively small in diameter and fairly high to accommodate formers or containers. The company, however, is wondering whether there could not well be some application where a long narrow vessel might be convenient, provided that the pressure was only comparatively low. It would mean that if it was desired to subject a product during manufacture to a steaming process, this long vessel could be inserted in the flow line.

HCl Control System

Liquid Systems Ltd., Holmethorpe Avenue, Redhill, Surrey, report that they are engaged in the design and installation of a number of control systems for liquids. Among these is a system which, by the operation of a remote push-button, withdraws an accurately measured quantity of concentrated hydrochloric acid from storage tanks and transfers it to the selected vessel 300 ft. away.

New Chemical Resistant Protective Clothing

James North and Sons Ltd., 54a Tottenham Court Road, London W.1, announce a new range of clothing in p.v.c. coated and impregnated nylon, which, while being considerably lighter and easier to wear than many conventional based fabrics, gives equal resistance to chemical substances and even greater strength and abrasion resistance.

A new apron has been developed with extra resistance to fatty or oily substances. It is stated that tests prove these new aprons to have as much as 700% increased resistance in the case of animal fats, olive oil and white spirit, 300% in the case of high octane petrol and light petroleum, 4-500% for diesel oil, transformer oil, toluene, benzene and 800% in the case of kerosene.

Metrovick Equipment for Terylene Plant

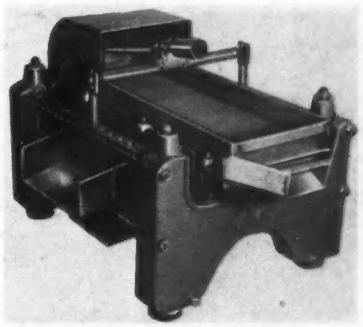
A new 11 kV switchhouse is to be built at I.C.I. Wilton Works as part of the Terylene expansion project. **Metropolitan-Vickers Electric Co. Ltd.**, Trafford Park, Manchester 17, have received the order for the 11 kV switchboard to be installed in the new substation, which will be a 26-panel, 250 MVA, Type V1H board with air-insulated busbars and Type H2R and Type H15 oil circuit-breakers.

Following the commissioning late in 1958 of a 27,200 kW, 3,000 r.p.m., back-pressure turbine-generator at Wilton Works, A.E.I.'s Turbine-Generator Division is completing manufacture of a second unit of the same capacity for this industrial power station. Both these machines are for operation with steam conditions of 1,600 p.s.i.g. 1,050°F at the turbine stop valve. Commissioning of the second unit is scheduled for December 1959.

The division is also supplying the associated feedwater heating, deaerating and evaporating plants with this turbine-generator.

Gyratory Separator

The Russell Separator Mark III, manufactured by **Russell Constructions Ltd.**, 9 Adam Street, London W.C.2, is made to strain out solids suspended in a liquid or viscous medium at very



Russell separator Mark III

rapid rates. The effluent is fed to the screen through a nozzle which gives it a form of turbulence. The screen, to which a gyratory motion is imparted, vibrates in such a manner that, while not itself rotating, each point upon its surface is describing a circle of minute diameter in a horizontal plane at about 1,500 gyrations per minute.

This gyratory vibration eliminates any possibility of clogging or blinding of the mesh and causes the solid matter to be held in suspension while the liquid is being forced through. The dewatered solids travel with a rolling motion over the dry part of the mesh towards the outlet, losing all the excess liquid they may be holding, and are delivered at the opposite end to the liquid outlet.

Throughputs as high as 15,000 gall. per hour can be obtained by this type of unit. The Russell separator Mark III is a compact machine with a mesh area of only 7 sq. ft. The mesh, which can be as fine as 40,000 apertures per sq. in., is mounted in a frame which is rapidly detachable for remeshing purposes.

Cartridge Condenser

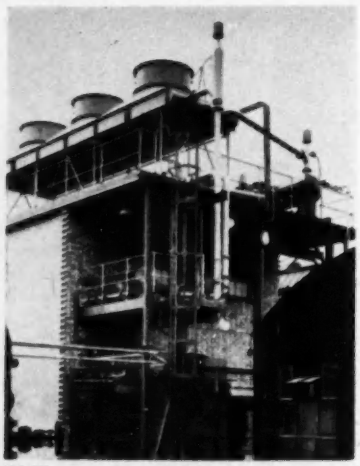
Powell Duffryn Carbon Products Ltd., Chemical Engineering Division, Springfield Road, Hayes, Middlesex, have added to their range of graphite heat exchange equipment a condensing unit for handling corrosive vapours. It consists

of a graphite element or cartridge enclosed in a cylindrical steel jacket with carbon inlet and outlet heads. The new unit, known as the cartridge condenser, is available in eight sizes ranging from 4 sq. ft. to 200 sq. ft. H.T.A.

The cartridge condenser is said to offer exceptional resistance to acids, alkalis and solvents, high thermal conductivity and low pressure drop. The units are of simple robust construction, light in weight and occupy considerably less space than is normal for equipment of equivalent performance. Each unit carries a 12 months' guarantee.

Wellington Air-Cooled Heat Exchangers

Since they showed their air-cooled heat exchanger at the Chemical and Petroleum Engineering Exhibition, **Wellington Tube Works Ltd.**, Tipton, Staffs, have had substantial inquiries



Wellington air-cooled heat exchangers of the induced draught type mounted on a roof to cool furnace walls

and orders for a wide range of duties. These include water cooling on closed circuit condensing and cooling of methanol, propylene, aniline and benzene, as well as condensation of steam from a mixture of steam, CO_2 and H_2S.

The latter duty is particularly interesting because the freedom from cooling water corrosion in an air-cooled heat exchanger has enabled the company to design most economically in aluminium, which appears to be a suitable material to resist CO_2 and H_2S.

Hard Surfacing Alloy

Hard surfacing pump plungers and spindles, valves and valve seats for chemical pumps, and hard surfacing screw conveyors for the handling of lime sludge, calcium carbide and other chemical powders and slurries, are being made by **A. S. Young and Co. Ltd.**, Woodside Lane, London N.12. The screw conveyors vary considerably in size, the largest handled during the current year being 12 in. in diameter by 11 ft. long.

This hard surfacing process—Colmonoy—comprises a series of hard-facing alloy welding rods having various wearing resistant properties. It is also being applied to the salvaging of worn mixer shafts and can be applied to most moving parts that are subject to wear or corrosion.

New Sigmund Pumps

An order for 81 pump units for a wide variety of applications in a chemical firm, received recently by **Sigmund Pumps Ltd.**, Gateshead, was met by supplying four types of pumps (79 of the units coming from three types). Although part of the standard Sigmund range, these units incorporated special features for the applications concerned.

Two new products added to the company's chemical range in the past year include the Sigmund BMG stainless steel self-priming pump fitted with mechanical seal. An open impeller enables the unit to handle solids, crystals and slurries with minimum N.P.S.H. requirements, while the self-priming feature eliminates storage tanks or sumps and the necessity for repriming. Other features include provision for wear between the impeller and volute wear plate. Outputs are up to 130 g.p.m. against heads up to 190 ft.

The new Sigmund zero gland leakage pump, constructed in stainless steel, is of the canned rotor type and has no glands or mechanical seals. Lubrication is by the pumped liquid. Outputs are up to 8 g.p.m. against heads up to 60 ft.

Miniature Electronic Recording Potentiometer

Potentiometric and pneumatic recorders by **Electroflo Meters Co. Ltd.**, Park Royal, London N.W.10, can now be grouped logically on panel for miniature presentation without degrading electrical signals to pneumatic signals before recording. 5 mV full-scale deflection is provided and resolution is 1:1,000. There is continuous standardisation with manual checking facilities on panel instrument. Amplifier(s) are rack-mounted separately behind the panel.

More Versatile Weighing Machine

The Richardson Scale Co. Ltd., Bulwell, Nottingham, announce important improvements to their H.17 semi-automatic weighing machine, which makes it more versatile in handling a wider range of materials, and ability to fill greatly differing sack sizes. All models now have a quickly detachable sack-holder arrangement so that a holder can be removed from a machine, an alternative size fitted without the use of hand tools, in less than 30 seconds. This means that a user filling more than one size of sack is not faced with any shut-down time when changing over. When more than one size of sack-holder is supplied with a machine they are all calibrated to the same weight to avoid re-taring after changing.

Other changes are the fitting of a more sensitive cut-off gate trigger giving cut-off much closer to correct weight and even fully automatic operation when weighing free flowing granular materials under suitable conditions. A flow regulator, adjustable from outside the weigher housing, controls the filling rate; this is necessary when the material being weighed is changed from light bulky materials to dense free flowing granular types.

In spite of these and other new features, price of the machine is unchanged.

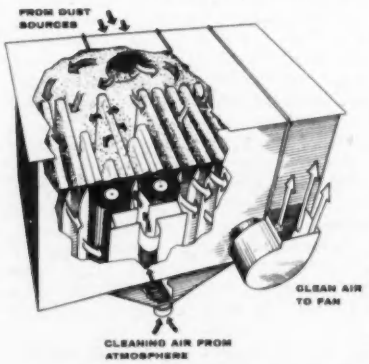
Dynaclone Self-cleaning Dust Filter

The Dynaclone dust filter, introduced by **Andrew Air Conditioning Ltd.**, 57-59 Victoria Street, London S.W.1, in 1949 has been improved with the 'roller cleaner' simplified method of cleaning. Advantages for the new model are said to be easier filter bag change; the resilient rubber rolls form a dust seal during bag cleaning; 8-wheel carriage suspension; easy access for inspection and maintenance.

The rolls are made of wear-resistant rubber combined with an inner filling of sponge rubber. This construction provides maximum resiliency as the rolls travel over the dust wall. The Dynaclone, which is designed for applications where the process ventilated is continuous and dust volume and concentration are high, is shown under suction from the fan.

As air passes into each bag, the dust is left on the outside surface and only clean filtered air is drawn through the fan. The deposited dust is continuously cleaned from filter bags, one at a time. Bags not being cleaned remain in operation. The exhaust fan keeps the filter under negative pressure, causing air from the dust source to flow through the bag; it also draws air in from outside atmosphere for cleaning the bags. Dust hoppers receive the dust when the bags are cleaned by the roller cleaner.

Access to the filter is provided by doors at both ends, allowing maintenance and inspection. Dynaclone filters can be supplied in various sizes and capacities with from one to three tiers of tiler bags and up to four hoppers.



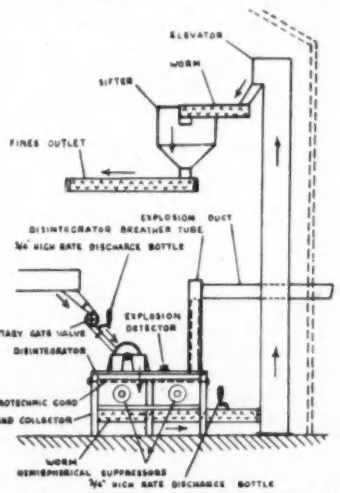
In the diagram, the rollers can be seen sealing adjacent filterbags

Further information on any of the products reviewed here may be obtained from the manufacturers or by using the reader enquiry form on p. 429.

40 EXPLOSIONS CONTROLLED BY GRAVINER TECHNIQUES

TECHNIQUES and equipment introduced by the **Graviner Manufacturing Co.**, 29 St. James Street, St. James, London S.W.1, have during the last five years suppressed or controlled 40 explosions, the company report, and on no occasion was any damage suffered by the plant.

The scope of venting has been considerably widened by the introduction of detonator operated Armourplate glass bursting discs. The operation of



Explosion detector in sulphur compound grinding plant

this type of disc is initiated by explosion detectors of the same type used in suppression systems. A recent development is the ball catch explosion relief valve. The valve is held in the closed position by the pressure exerted from the ball catch mechanisms. At a predetermined pressure the balls are ejected and the valve, being completely free, opens very rapidly. These valves are suitable for high temperature applications where self-contained and self-closing units are required.

For the venting of runaway reactions where more time is available, a pneumatically operated Armourplate glass bursting disc can be used.

It is sometimes necessary to inject suppressant ahead of a flame front to prevent its propagation through an entire plant; this technique is known as advance inerting. In some cases advance inerting by itself would not be sufficient as in cases where the flow of inflammable gas or vapour through pipelines cannot be rapidly terminated. By locating high speed isolation valves in suitable positions a positive barrier is provided to prevent propagation, and at the same time the flow of gas or vapour is rapidly terminated.

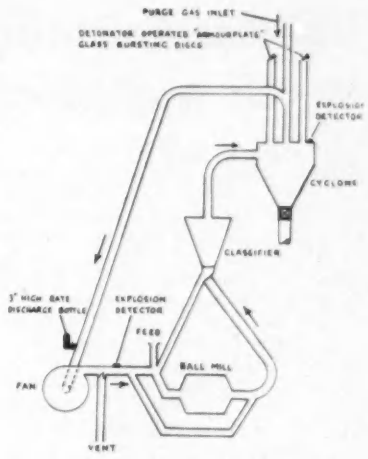
In most explosions it is an advantage to shut down the plant or stop the process as quickly as possible. With Graviner protection systems this is done by means of a relay incorporated within the electrical power unit which is an integral part of any system. The power unit also provides an automatic standby electrical supply from dry batteries as well as continuous monitoring of external circuits.

The following examples of plants fitted with Graviner equipment show how explosions may occur and how they can be controlled.

Sulphur Grinding.—In this plant the grinder discharges into a wooden hopper which is fitted with a suppression system. Sulphur is one of the more explosive dusts and the equipment on this plant has operated on five occasions. With such a plant, explosions would generally be expected to originate from the grinder, either due to the ingress of foreign material or to a mechanical failure in the grinder itself. Some difficulty was experienced in tracing the trouble, but after careful investigation it was established that the worm conveyor at the bottom of the hopper was misaligned and generating sufficient heat to initiate an explosion.

Pyrites Grinding.—This system is designed to protect a relatively weak cyclone in a plant which is otherwise of robust construction. The plant normally operates under an inert atmosphere, but should this fail there is the possibility of an explosion being initiated by sparks within the mill or by a 'flash-back' from a roaster connected to the mill. The system has operated on three occasions. One was probably caused by a 'flash-back' and the others by a temporary interruption of the feed causing the mill to run only partially full, thus allowing sufficient sparks to be generated to initiate an explosion.

Cellulose Acetate.—The equipment on this plant has also operated on three occasions, two of which were caused by the ingress of foreign material into the grinder and the other by the distortion of the grinder screen which came in contact with the rotor hammers.



Explosion detection in pyrites grinding plant

Demineralisation Plants for Mexico

WILLIAM Boby and Co. Ltd., water treatment engineers, Rickmansworth, Herts, are supplying two complete demineralisation plants for Mexican power stations. One is for a power station in Oaxaca being built by Associated Electrical Industries Export Ltd., for the Comision Federal de Electricidad Juchitan. Boby's are also supplying acid dosing plant for condenser cooling water.

The second similar set of equipment is for another of the Comision's stations, as yet unnamed.

Cosmetic Chemists International Society

As a result of informal discussions in London earlier this year the International Federation of Societies of Cosmetic Chemists has been formally constituted at meetings in Brussels.

The first president elected by the council was M. G. de Navarre, first president of the Society of Cosmetic Chemists (U.S.A.). Mrs. E. Millman, general secretary of the British Society of Cosmetic Chemists, 2 Lovers Walk, London N.3, is acting as general secretary to the International Federation.

Import Duty Exemptions Extended

EXEMPTIONS from import duties on a wide range of industrial chemicals and pharmaceuticals which were due to expire on 30 September have been extending for periods ranging up to 30 September next year by a Treasury order. This is the Import Duties (Temporary Exemptions) (No. 9) Order, 1959, which comes into operation on 1 October.

Exemptions on about 1,800 chemicals have been extended. About 260 items have been withdrawn from exemption. Some, however, have been redesignated and qualify for exemption under other schedules. Others have had exemption withdrawn at the request of British manufacturers because they are now able to produce in sufficient quantity to satisfy demand.

The duty is normally one-third.

Chemical Works Given 'Clean Bill of Health'

Fumes escaping from the works of Charles Lennig and Co. Ltd., chemical manufacturers, were not dangerous to health, the medical officer for Jarrow, Dr. T. C. Falconer, told the town's health committee. He said the fumes had escaped accidentally and immediate steps were taken to control them.

Unikote Ceramic Coatings for Metals and other Materials

DESIGN and size of conventional, solid ceramic parts are limited by the nature of the materials and methods of manufacture or are being produced in other less suitable materials because of size or complexity. Also many other parts and components are at present being made in materials technically suitable, or the best available, but which are very expensive. Unikote ceramic coatings developed by the United Insulator Division of the Telegraph Condenser Co. Ltd., Oakcroft Road, Chessington, Surrey, may help to solve many of these problems.

Several Unikote ceramic coatings for metals and other materials are available and in production. Unikote T.1.—a form of alumina which is gem-hard, wear-resistant and electrically insulating; Unikote T.2.—a form of zirconia which is used primarily for thermal insulation but is also an electrical insulator; Unikote T.6.—a form of rutile which is wear resistant and electrically conductive; and Unikote C.51—a combination of metals providing protection against high temperature oxidising atmospheres (this coating can be covered, if required, with Unikote T.1 or T.2). Still in development but soon to be available are other materials and combinations of materials, including dielectrics and other electrically insulating ceramics.

Materials which can be coated with Unikote, Telegraph Condenser state, are any of the common metals (mild steel, stainless steel, cast iron, brass, copper, aluminium, etc. Glass, solid ceramics, graphite and carbon, and some of the plastics are also suitable base materials. In fact, any metal part which permits covering by spraying can now be coated with Unikote and have the strength of the base metal and surface qualities of solid ceramic.

The basic coatings as applied are comparatively rough (C.L.A. values: 200-500 μ-in.), but several types of finishing processes are being used to produce various degrees of smoothness, including barrelling, grinding, lapping, buffing and hand polishing. These coatings are slightly porous (5-10% by volume) and where this is undesirable the pores can be sealed with a ceramic-loaded filler. Various sealers are available including epoxy resins, phenolic, p.t.f.e., vinyl compounds, silicones and chlorinated rubber.

All Unikote ceramic coating materials are stated to have melting points between 1500°C (2,700°F) and 2500°C (4,600°F) the bond between the coating and the base material limiting the maximum operating temperature. It is strong at normal ambient temperatures, remaining unaffected up to 100°C (212°F) for any coating. All basic coatings, unsealed, are generally suitable for temperatures up to 250°C (482°F) and combinations of coatings are available for temperatures up to 1,000°C (1,832°F).

Cost of Unikote coatings is directly proportional to an area and thickness and varies according to the type of material, the design of the part, the finish and dimensional limits required. They can be as little as 10s./sq. ft. for single coatings of standard finish.

Specific examples already proved and in production or currently undergoing trials include: pump seals, plungers and rods; rocket nose-cones and exhausts; various crucibles, melting pots, mixer blades and housings; fan blades; valves.

Medal For Analytical Chemistry

Pergamon Press, publishers of the international research journal in the field of analytical chemistry, Talanta, have instituted the Talanta Medal, an award with a value of 100 guineas for outstanding contributions to analytical chemistry.

World Textile Chemists Meet in U.K.

AT THE opening of the first meeting of the International Federation of Associations of Textile Chemists and Colourists to be held in the U.K. Mr. John Boulton (Courtaulds Ltd., Droylsden) said the congress brought together the results of several "vital lines of development in textile chemistry which have been going forward in recent years."

These could be summarised as threefold:

1. The replacement of expensive and slow batch dyeing processes, particularly in the case of loose fibres, yarns, slubbings and tows, by continuous dyeing processes with high productivity.

2. Techniques of dyeing more than one fibre in the same process with especial reference to hydrophobic synthetics in blend with hydrophylic natural fibres.

3. The attachment of dyes to fibres by permanent primary chemical bonds in place of weak secondary forces and the further extension of this new and revolutionary principle to fibres of differing chemical types.

Together these developments justified a new outlook in dyeing technology.

It was of the greatest importance that the textile chemist should view economic developments in the textile industry from the standpoint of technological advance, modernising, rationalising and economising all that he was called upon to do, and basing his forward thinking on a sound background of scientific research.

There was no point in the chemist producing a new textile fibre which was spinnable and weavable if it were not dyeable. There was no point in the dye technologist producing new dyeing methods, no matter how elegant, that transformed an inexpensive fibre into an expensive textile.

Monsanto Announce Three New Styrene/Butadiene Copolymer Latices

THREE styrene/butadiene copolymer-latices are now being made by Monsanto Chemicals Ltd., Monsanto House, 10-18 Victoria Street, London S.W.1, at their Newport, Mon, factory. These latices are suitable for coatings for leather and paper, for non-iron fabrics, for the backings of tufted carpets and rugs, and have applications in the manufacture of adhesives and emulsion paints.

Latex SB1 contains about 60% styrene. Latex SB2 is similar but contains an added stabiliser which improves its resistance to breakdown when subjected to strong shearing forces. They are compatible with other polymer latices, such as SBR and polystyrene, and can be used, for example, with Latex SB3, a material of higher styrene content (85%) for the production of harder and more rigid films.

Latex SB3 may also be used as a stiffener for latex foam products.

Geigy's New Softening and Antistatic Agent

IRGAVEL DC, new softening and antistatic agent of the Geigy Co. Ltd., Rhodes, Middleton, Manchester, is applied exhaustively in dry cleaning from the solvent rinse. It will broaden the range of finishes for the dry-cleaner.

It gives a soft cashmere-like handle to knitted garments made from Orlon, Acrilan, Courtelle, nylon, etc., as well as imparting antistatic properties which are important on these fibres. The softening effect is equally attractive on blankets and other raised fabrics of wool or other fibres.

Irgavel DC may be used in conjunction with Irgaset SRT, Geigy's recently introduced substantive retexturing agent, to give a firm finish with a soft surface handle. The physical properties of Irgavel DC and methods of application alone or with Irgaset SRT are given in Geigy circular No. T.C. 249.

Dyeing at High Temperatures

USING a high-temperature microdyeoscope which he invented, Dr. Henry E. Millson, technical adviser to the Organic Chemicals Division of the American Cyanamid Co., has confirmed that the dyeing rates of the newer synthetic fibres are increased appreciably by dyeing at temperatures above 212°F.

In London on Friday, 18 September, Dr. Millson showed a time-lapse film made with the aid of his microdyeoscope. It showed in 1 to 1½ minutes dyeings and processes that took from two to five hours and illustrated changes in dyes and fibres during high-temperature treatments which are of importance to the manufacturer of the dyes as well as those making and handling the fibres.

The microdyeoscope has a working range of from 40° to 325°F and requires pressures from 15 p.s.i. (atmospheric) to about 60 p.s.i.

Socabutyl Now Being Marketed in U.K.

THE International Synthetic Rubber Co. Ltd., Hythe, Southampton, have been appointed sole agents in the U.K. for Société du Caoutchouc Butyl (Socabu)—who are now in full production of six main standard grades and three non-staining grades of Socabutyl butyl rubber.

The Société du Caoutchouc Butyl has been formed by a consortium of 10 companies—among these being Esso, C.F.R., Michelin, Dunlop and Kleber Colombes—for the purpose of manufacturing butyl rubber. The company operates under licence from Esso Research and Engineering Co., who have supervised the construction and initial operation of the plant.

The Socabu plant is situated at Notre Dame de Gravenchon, between Rouen and Le Havre. Pipelines connect the plant to the refineries of Esso at Port Jerome and C.F.R. at Gonfreville which supply the major raw materials. Construction of the £5 million 50-acre plant began in October 1957, and involved the building of an isobutylene extraction unit, polymerisation unit, finishing unit and ethylene (from alcohol) production unit.

The plant is designed to produce at least 20,000 tons per annum of butyl rubber in six main standard grades (S34, S27, S24, S14, S04, S26) and three non-staining grades (N34, N27, N14). These grades differ according to their degrees of unsaturation (proportional to their isoprene content) and by their Mooney viscosity (proportional to molecular weight) and in consequence the central control room is a vital link in the production process.

Approval in Sight for W.M.G.B.'s Lurgi Gasifier

ON THE brink of obtaining final approval for a £6.5 million Lurgi total gasification plant at Coleshill are the West Midlands Gas Board. Chairman of the West Midlands Gas Consultative Council, Alderman John Lewis, told a committee meeting this week that Lord Mills, Minister of Power, had informed him that the conditions attached to the approval in principle (which has already been granted) should not give any serious delay. The two principal conditions are: that W.M.G.B. should prepare up-to-date production costs, including capital charges; and that it should complete arrangements for the supply of coal during the life of the station. When these provisions are met the final application will be dealt with most urgently.

Initial decision to install a Lurgi plant was taken by the board in 1951. A large number of possible sites had been inspected and rejected, in many cases because of the lack of facilities for disposing of the effluent. In December 1958, the Ministers of Power and of Housing and Local Government finally gave approval in principle to the Coleshill site, subject to certain conditions.

Boots New Research Centre will Increase Stress on Medical Work

A NEW £750,000 biological research centre opened in Pennyfoot Street, Nottingham, by Boots Pure Drug Co. Ltd., on Tuesday, will it is hoped give new impetus to the company's research into certain specific infectious diseases. These include tuberculosis, influenza and the common cold, as well as longer term investigations into rheumatism, diabetes and coronary heart diseases.

Investigations will also be carried out into possible new treatments for tropical diseases, a field in which the company has specialised. Research involving antibiotics will be linked with the work of the specialist laboratory opened in 1956 on the site of the antibiotics factory on the outskirts of Nottingham.

The seven-storey building with its 24 laboratories will provide the most up-to-date facilities in Britain for research in pharmacology and chemotherapy and for analytical and control work in the bioassay and microbiology divisions of the company's standards department.

The erection of this new biological centre is part of a general programme of modernisation and expansion of the company's research facilities. Medical research at Boots has been expanding rapidly and in the last three years there has been an increase of 25% in graduate staff engaged in this work. Space has been allowed in the new building for a further increase of 50%.

The building also houses the company's scientific library of 25,000 volumes, believed to be the largest owned by any pharmaceutical company in the U.K., and includes a new lecture theatre to seat 200. An up-to-date feature in the laboratories is a radioactive isotope unit which will give greatly improved scope for the study of the movement of drugs in the body.

Administrative offices of Dr. G. I. Hobday, Boots director in charge of all branches of research, are also housed in the building, as is the medical department which is responsible for the clinical evaluation of new drugs and products and for liaison between research scientists in the laboratory and clinicians.

New Works for Cheshire Detergent Firm

COUGH candy, lubricants and detergents were the successive efforts of a Cheshire pharmacist, the late Wilfred Hipkins, to start a manufacturing business. His efforts eventually found success in the founding in 1929 of the Reddish Chemical Co. Ltd., whose new works at Cheadle Hulme were opened on Thursday, 17 September.

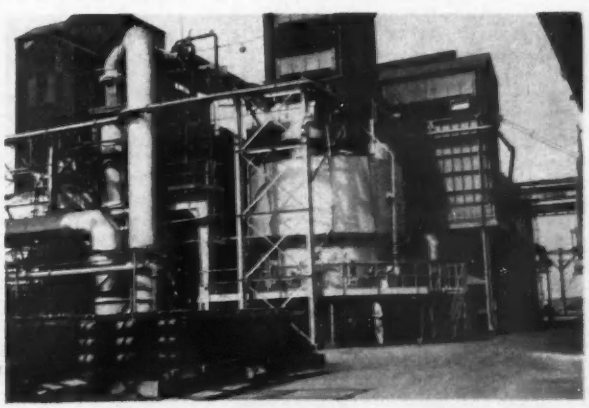
Professor H. D. Kay, former director of the National Institute for Research in Dairying and now a consultant to the World Health Organisation, officially opened the factory, which has a floor space of 16,500 sq. ft. and includes a laboratory. The office block has another 2,000 sq. ft. of floor space.

First Ferrous Sulphate Decomposition Plant in the U.K.

A PLANT producing SO_2 gas for sulphuric acid manufacture using by-product ferrous sulphate has recently been commissioned at the Grimsby Works of British Titan Products Co. Ltd., by Chemical Construction (G.B.) Ltd., and Dorr-Oliver Ltd.

This plant decomposes dried ferrous sulphate with coal in fluidised bed roasters. It was designed and built by Chemico using Dorr-Oliver Fluo-Solid reactors. The product SO_2 gas is converted to SO_3 for sulphuric acid production in one of the existing converters on the plants supplied by Chemico.

The residue left after the extraction of the acidic component is relatively pure iron oxides, which can be readily used by the steel industry. No disposal problems exist as the former unwanted by-product has been converted into two profitable materials.



First U.K. ferrous sulphate decomposition plant

Overseas News

DUTCH MEKOG FIRM TO USE NATURAL GAS FOR NITROGEN FERTILISERS

THE Netherlands Gas Board (Nederlanse Staatsgasbedrijf) and the foremost metallurgical group, Koninklijke Nederlandsche Hoogovens en Staalfabrieken N.V. of Ijmuiden, have concluded an agreement relating to the supply of about 200,000 cu. m. (7 m. cu. ft.) of natural gas per 24 hours over a number of years.

This supply, which is derived from the oilfields of Western Holland, will be conveyed by pipeline to Ijmuiden over a distance of 50 miles. It will be used chiefly by the MEKOG concern (N.V. Mij. tot Exploitatie von Kooksovengassen) in a new plant for the production of nitrogenous fertilisers.

This plant will be put into operation by the end of next year and the firms concerned point out that this will be the first occasion on which natural gas will be used in the Netherlands as a basic raw material for the chemical industry. In addition to its use by the MEKOG concern, natural gas will be used as a fuel in the manufacture of iron and steel.

Big New Brown Coal Seams in Australia

Brown coal discovered in a new field at Anglesea, Victoria, last year may play an important part in the Australian chemical industry. A typical approximate analysis of the coal as mined is: moisture 45.5%, volatile hydrocarbon 25.7%, fixed carbon 26.5%, ash 0.7 to 1.5%. A Fischer Heinz assay showed the coal to contain 7% tar.

Investigations have revealed 17 seams of coal, the top seam alone containing more than 100 million tons.

Israel Plant to Refine Cyprus Copper Pyrites

British and German firms will supply equipment for a copper pyrites refining plant to be set up near Haifa by Israeli and Cypriot interests. The Israeli government is reported to be lending £300,000 for the establishment of the plant, which will use copper pyrites from Cyprus.

The plant is due to start operations in 1961 with a yearly capacity of 30,000 tons of pyrites, which will be trebled later.

Dow International Teams with Pechiney for Plastics

Dow International will shortly set up a multimillion dollar plastics plant with Pechiney of Paris at Ribecourt (near Paris) through their jointly owned company, Plastichimie S.A. The plant will produce Styron and Saran. Pechiney are to furnish the operation staff and market the products in France. In addition, Pechiney's polystyrene plant at Ribecourt will become part of the new corporation. Construction is due to begin this year and the plant is scheduled to be in operation in 1961.

Ammonia from Norwegian Waste Gases

An ammonia plant is planned to be built by the Norwegian chemical concern Norsk Hydro which would use as feed waste gases from the Norwegian State ironworks at Mo. A plant for the production of ammonium sulphate is also intended to be erected on the same site.

Exploiting Natural Gas in Germany

The West German chemical producers Badische Anilin- und Soda-Fabrik AG, of Ludwigshafen-on-Rhine, have signed a contract with the Wintershall-Mobil Oil-ITAG consortium to receive natural gas from deposits now being exploited at Frankenthal, a few miles from the BASF plant. They will receive at least 100,000 cu. metres of gas a day which they will process to synthesis gas.

Dutch Firm Building Synthetic Phenol Plant

Koninklijke Zwavelzuurfabrieken v/h Ketjen N.V., Amsterdam, have decided to build a plant for the production of synthetic phenol. Anhydrous sodium sulphite will become available as a by-product. Start of production is planned towards the end of next year.

Part of the production is destined for captive use to produce phenol derivatives. Some of them are already made by Ketjen, and the production of others is planned for the near future. The remainder of the phenol production will be available for sale on the Dutch market.

Japan May Aid Indian Fertiliser Project

The Indian Government has decided to erect a large-scale plant for the production of synthetic fertilisers in the region of the recently-discovered natural gas deposits at Nahorkatiya, in Assam. Japanese interests are said to be considering participating in the project, in which case part of the 250 million rupees credit granted last year to India by Japan would be used.

Viton Synthetic Rubber Price Reduced

Price of Viton synthetic rubber, which is produced by E. I. du Pont de Nemours and Co. Inc., is being reduced by $5 per lb. to a price of $10 per lb., effective 1 October. The reductions apply to Viton 'A' and Viton 'A-HV' grades. The rubber is being used for aircraft and missile applications where resistance to extremes of heat and chemical attack is required.

Carbide Industry for India Under Consideration

Prospects are being considered for the establishment of a calcium carbide industry in South India—which has rich deposits of crystalline limestone—following investigation in the use of this mineral conducted at the Central Electro-Chemical Research Institute at Karaikudi, Madras State. The current annual production of calcium carbide is 5,000 tons, but the product is below the average quality of imported material.

The process developed at the Karaikudi Institute, consisting of a charge of unburnt crystalline limestone, charcoal and petroleum coke in three phases, has now made it possible to produce 'A' grade carbide in the country. The annual rated capacity of the industry will be raised to 40,000 tons by 1960-61.

Large quantities of crystalline limestone are available in the Tinnevelly and Salem districts of Madras.

German Offer to Finance Pernambuco Rubber Plant

German Ferrostahl group has submitted an offer to finance the cost of machinery and construction of a synthetic rubber plant in Pernambuco. Apart from proposals reported to have been received from French interests also, a first offer had been submitted recently by the U.S. company, Koppers International, using as raw material alcohol obtained from the Sugar and Alcohol Institute and other suppliers. The company would contribute $10 million towards the cost of a butadiene unit estimated at $3½ million, and the cost of transport, installations, etc. On the basis of a yearly production capacity of 40,000 tons of synthetic rubber, the factory would need about 120 million litres of alcohol. The plant's organisation would be undertaken by the Comissao de Desenvolvimento Economico, until a Board of Directors is appointed.

India Receives U.S. Report on Synthetic Rubber Possibilities

Manubhai Shah, Indian Minister for Industry, stated recently that the report of U.S. experts regarding the establishment of a synthetic rubber plant had since been received and was being examined. The plant might be located near Bareilly, Uttar Pradesh. No final decision had as yet been taken.

For the plant, with a capacity of 20,000 to 30,000 tons, about 5,000 to 7,000 tons of styrene and 15,000 to 20,000 tons of butadiene were needed the Minister indicated. If the factory were located at Bareilly, the raw material, ethylene and styrene might be manufactured from coke oven gases at Rourkela or from alcohol itself and benzene at Bareilly.

PEOPLE in the news

● **Lord Heyworth,** chairman of Unilever since 1942, is to retire next year He reaches the official retiring age of 65 next month, but will carry on as chairman until Unilever's annual general meeting. He will then become a director of the Hudson's Bay Co. Lord Heyworth joined the overseas department of Lever Brothers at the age of 18. In 1931 he became a director of the firm. He was appointed chairman of Joseph Crosfield and Sons Ltd. in 1929. In 1941 he was appointed vice-chairman of the parent company and in 1942 became chairman in succession to the late Sir F. d'Arcy Cooper. He was created a baron in 1955.

● **Mr. F. J. Jervis, B.Sc.,** has been appointed contracts manager of Nash and Thompson Ltd., Chessington, Surrey. Mr. Jervis, who is responsible for all commercial aspects of research, development and manufacturing contract work, joined the company from the Guided Weapons Department of the Ministry of Supply where, since 1951, he had been a production engineer.

● **Mr. G. H. Alder,** who has been appointed a director of Amal Ltd., an I.C.I. subsidiary, has been with the

G. H. Alder who joins the board of Amal Ltd.

company and its predecessor since 1925. He was appointed assistant works manager in 1935 and works manager in 1955. He will continue to be responsible for the production side of the business.

● **Prof. E. Hirst,** Professor of Organic Chemistry in the University of Edinburgh, and **Prof. R. G. W. Norrish,** Professor of Physical Chemistry, Cambridge, were guests at the recent fortieth anniversary congress of the Polish Chemical Society. They heard the Minister for the Chemical Industry, Mr. Radlinski, say production would be nearly doubled under the 1961-65 five-year plan.

● **Mr. G. J. Lyons** has been appointed secretary of the Institution of Plant Engineers in succession to **Mr. R. F. Farmer,** who has resigned to take up an appointment with the Institution of Civil Engineers.

● **Mr. W. W. Nicholas,** Midlands representative of Walker, Crosweller and Co. Ltd., manufacturers of Arkon industrial instruments, has left them to take up a teaching appointment at Birmingham Technical College. He will be succeeded by **Mr. E. W. Tinsley,** who comes to them from Radiation Ltd., where he was concerned with appliance development. Before that he was with the North Western Gas Board.

● **Mr. F. L. Thurston-Moon,** a director of R. H. Cole and Co. Ltd., 2 Caxton Street, London S.W.1, was appointed managing director on 7 September of Dr. Beck and Co. (England) Ltd., an associated company of R. H. Cole and Co.

● **Mr. W. S. Heywood** has resigned from the Board of the United Indigo and Chemical Co.

● **Mr. Bernard Sparling** has taken up the appointment of managing director of Evans Medical's subsidiary company (Evans Medical (Nigeria) Ltd.). He will be stationed in Lagos, but the company also has a branch at Aba, Eastern Nigeria. Mr. Sparling has been a departmental manager at Evans Medical, Speke, for several years.

● **Dr. W. Albert Noyes, Jr.,** Charles Frederick Houghton Professor of Chemistry at the University of Rochester, U.S., has been chosen by the International Union of Pure and Applied Chemistry as its president for the next four years. Dr. Noyes succeeds Dr. Arthur Stoll of Switzerland as head of IUPAC. From 1947 to 1951, Dr. Noyes was vice-president of IUPAC. He has been editor of *J.A.C.S.* since 1950 and scientific adviser to various government agencies. His wartime contributions brought him the King's Medal for Service in the Cause of Freedom from Great Britain.

● The President of the Board of Trade has appointed **Dr. F. Llewellyn Smith, M.Sc., M.I.Mech.E.,** and **Mr. I. W. Macdonald, M.A., C.A.,** to be part-time members of the National Research Development Corporation. Dr. Llewellyn Smith is managing director of the Motor Car Division of Rolls Royce Ltd. Mr. Macdonald is chairman of the National Commercial Bank of Scotland Ltd., and of Lloyds and Scottish Finance Ltd. They take the places of Sir John Duncanson and Sir Rowland Smith.

● **Mr. H. D. Macmurray** and **Mr. T. S. Ling,** senior directors of George Scott and Son (London) Ltd., of the Balfour Group of Companies, have just left this country for overseas. Mr. Macmurray is making a world sales tour, which will include visits to the U.S., Canada, New Zealand, India and Australia. In the latter country, he intends to pay particular attention to the development of George Scott and Son (Australia) Ltd., Sydney, and to the expansion of trade in that area. Mr. Ling will visit Canada and the U.S. In Canada, he will liaise with Dominion, Scott, Barron Ltd., the Canadian branch of the Balfour Group; in America he will have discussions with the Rietz Manufacturing Co., of Santa Rosa, Cal. Mr. Ling heads the Rietz Division of George Scott and Son (London) Ltd., who manufacture in the U.K. under licence, a wide range of equipment for the chemical and food processing industries. Both men expect to be away for about two months.

● **Dr. Hermann Rathert,** director of the West German synthetic fibre manufacturing company Vereinigte Glanzstoff-Fabriken AG, Wuppertal, and a world pioneer in synthetic textiles, has been awarded the Grand Service Cross of the Federal Republic for his services to the furtherance of research in the field.

● Carbide Industries Ltd., a member of the British Oxygen Group of companies, announce the appointment at their carbide and acetylene factory at Maydown, near Londonderry, of **Dr. T. W. T. Baillie, B.Sc., Ph.D.,** as production manager, **Mr. W. W. Ringland, B.Sc., A.I.Chem.E.,** as chief works engineer, **Mr. A. R. Robertson** as commercial manager and **Dr. R. D. Thrower, B.Sc., Ph.D.,** as works research and development manager. Before joining Carbide Industries, Dr. Baillie was for 11 years with the I.C.I. Plastics Division, and prior to that, was assistant lecturer in chemistry at Queen's University, Belfast. Mr. Ringland, who was also a Q.U.B. graduate, joins Carbide Industries from I.C.I. Heavy Organic Chemicals Division. Mr. Robertson, a solicitor, joined British Oxygen in 1956, while Dr. Thrower joined the group in 1947 and 18 months ago was transferred to Carbide Industries.

DIARY DATES

MONDAY 28 SEPTEMBER

S.C.I.—London: Visit to Thos. Hedley and Co. Ltd.'s factory, West Thurrock, leaving Russell Sq. 1 p.m.

THURSDAY 1 OCTOBER

Inst. Metal Finishing.—Manchester: Engineers' Club, Albert Sq., 7.30 p.m. 'Control and new development in chrome plating'.

Polarographic Soc.—London: Duke of York, 8 Dering St., W.1, 7.30 p.m. 'The use of the rising mercury electrode' by Mr. G. E. Penketh (I.C.I.).

S.C.I.—London: Royal Soc. Medicine, Wimpole St., W.1 9 a.m. Symposium. 'Enzymes in the manufacture, storage and distribution of food'. (Also Friday).

FRIDAY 2 OCTOBER

S.A.C. with R.I.C. and S.C.I.—Oxford; Univ. Inorganic Chem. Lecture Theatre, 6.30 p.m. 'Quantitative commonsense and the chemist' by Dr. E. C. Wood. Preceded by visit to Harwell, 1.45 p.m.

Soc.Instr.Tech.—Fawley: Esso Refinery, 5.30 p.m. 'Feedback' by Mr. R. S. Medlock (president).

Commercial News

Borax (Holdings)

A progress report issued by Borax (Holdings) Ltd. indicates that the company has expanded its operations in the Argentine by acquiring a company manufacturing industrial paints and varnishes and printing inks. Borax (Holdings) have also recently erected a new plant to refine borate ore from local deposits and to supply Argentine industry with refined products. The company has large reserves of borate ore in South America.

Cancellation of two U.S. Services contracts for boron fuel production will have no substantial effect on the current sales of the U.S. operating company, U.S. Borax and Chemical Corporation, reports Lord Clitheroe, chairman, as deliveries of the fuel from the new plants have been very small. For the time being, the U.S. Defence Department is continuing with its development contracts for boron fuels.

Lawes Chemical

A slight increase in turnover last year is reported by Lawes Chemical Ltd., manufacturers of fertilisers. The chairman says he has every reason to hope that the coming year will show an improvement. The efficiency of British agriculture is increasing every year and this involves a more intensive use of fertilisers. He looks forward with confidence to further expansion.

United Indigo

Gross net loss for United Indigo and Chemical Co. for the year to 30 June last, was £5,639 (same—£5,639). Tax is nil (£332). Surplus net sale of fixed assets is £6,686. Dividend on 5% preference share for six months to 31 December, 1958, already paid, absorbed £1,378 (5%—£2,587). No dividend on the ordinary shares is being paid (same).

Newton, Chambers

Newton, Chambers and Co. Ltd., are maintaining their interim dividend at 6%.

Deutsche Magnesite

West Germany's leading magnesite concern, Deutsche Magnesit AG, Munich, a fully-owned subsidiary of the General Refractories Co., of the U.S., has increased its capital from DM 6 million (some £500,000) to DM 12 million (about £1 million). The company will have to undertake a large amount of additional investment in connection with the common market trading system.

INCREASE OF CAPITAL

HUBRON SALES LTD., Chemical, etc., Albion Street, Failsworth, Manchester. Increased by £9,900, in £1 ordinary shares, beyond the registered capital of £100.

NEW COMPANIES

MOULD AND BISHOP LTD. Capital £100. Selling agents and consultants to the pharmaceutical chemical trades, etc. Directors: Peter R. Bishop, Alan J. Mould. Reg. office: Penryhn House, Penrhyn Road, Kingston on Thames.

SEMICONDUCTOR THERMOELEMENTS LTD. Cap. £100. Manufacturers of and licensees of and general research establishment for pure elements and chemical compounds, metals and alloys, semiconductors, etc. Director: A. Gelbtuch. Reg. office: 93-97 Regent Street, W.1.

Platinum Catalysts Duty Cut

The import duty on certain platinum catalysts is reduced from 10% ad valorem to 2s 9d a lb. by the Import Duties (General) (No. 9) Order, 1959.

The order also changes the tariff classification of certain additives for mineral oils.

Sharples Acquire German and U.S. Companies

ACQUISITION of a German and a U.S. company, announced on 23 September by Sharples Centrifuges Ltd., Tower Works, Doman Road, Camberley, will enable the group to augment further the services they now give to the chemical, process and food industries. Sharples recently purchased Gesellschaft fur Trenn- und Trockentechnik m.b.H., who manufacture the Contessor conical screen centrifuge, as part of their policy of maintaining a range of equipment to cover all separational applications. The activities of this company will continue as a division of Sharples, who state that orders have already been received for the Contessor.

With a view to expanding their centrifugal operations, Sharples have also purchased the Centrifugal Division of the Fletcher Works Inc., U.S. This will in future be known as the Fletcher Division of Sharples.

Chemicals Freed From Import Duty

CHEMICAL products are among goods freed from import duty by the Norwegian Government. A list is available for inspection in the Export Services Branch, Tariff Section, Board of Trade, Lacon House, Theobalds Road, London W.C.1.

A number of drugs and chemicals, reagent quality, laboratory grade or pharmaceutical quality, not packed for household use, will be admitted free into Australia under customs revisions.

Birlec Vacuum Furnaces for A.E.A.

At a total cost of some £22,000, the U.K. Atomic Energy Authority has ordered from Birlec Ltd., Birmingham 24, two special furnaces for annealing reactor fuel elements.

First International Staff Join 'Dragon' Project

Three engineers, one from Switzerland and two from Italy, arrived in England on Monday, 21 September, as the advance guard of some 90 European engineers and scientists who, with 160 from the U.K. will comprise the international staff of the O.E.E.C. Dragon project at the Atomic Energy Establishment, Winfrith, Dorset.

The aim of this project is to develop and build an experimental version of the high temperature gas-cooled reactor.

Natural Gas for North East

Imperial Chemical Industries Ltd. and British Petroleum Ltd. have arranged with the North Eastern Gas Board for the supply of natural gas from wells in Eskdale, near Whitby, Yorkshire. The natural gas was originally found by B.P. Exploration in 1938 during the course of its oil search in the U.K. This discovery has been further explored jointly with I.C.I. since 1945, but it was established that the reserves of gas were insufficient for I.C.I.'s requirements, although they would be usable by the gas industry.

Market Reports

LITTLE CHANGE ON ACTIVE MARKETS

LONDON There have been no outstanding features on the chemicals market during the past week and prices continue steady at recent levels. The chief industrial outlets are taking good quantities against contracts, and new inquiry both for spot and forward delivery has been on a fair scale.

Overseas demand has been well maintained, covering a wide range of industrial and fine chemicals.

Interest in agricultural chemicals is quiet while conditions in the coal-tar products are steady and unchanged.

MANCHESTER Prices in virtually all sections of the Manchester chemical market during the past week have continued on a steady to firm basis. Both home and export buyers are mostly calling for steady deliveries and a fair amount of replacement business is under negotiation, current inquiries covering the alkalis and a wide range of other products. The market for fertilisers has been more active, with increasing interest shown in basic slag, the compounds, and sulphate of ammonia and other nitrogenous lines. A steady business is reported in creosote oil, cresylic acid and xylol among the tar products.

SCOTLAND Market conditions were slightly quieter during the past week in some directions, but on the whole the general position was one of reasonable activity. Quantity demands for the basic heavy chemicals are still being maintained together with a fair proportion of forward bookings. Prices generally showed little alteration and for the most part continued firm. The overseas market remains satisfactory with a good volume of enquiries still being received.

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The type of material to be handled and the rate of output determines the scale model which should be considered. We cannot emphasize too strongly that you should avail yourself of the services of our Engineering Application Department who will not only check your material but finally decide the scale to use according to the duty involved.
All our recommendations are based on many years of our experience in England and that of our parent American company and their associates throughout the world.
RICHARDSON'S are the largest organisation in the world on Automatic Scales—do not hesitate to consult them.

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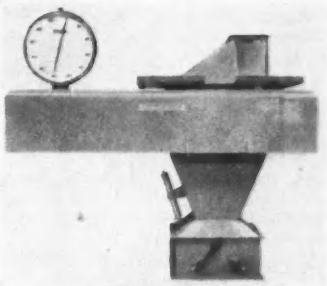
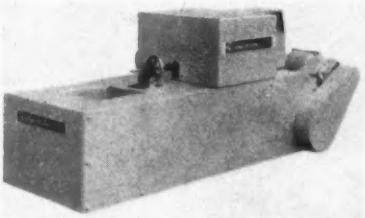
HOPPER SCALES

Used for intake or Shipping Scales but increasingly being used for material blending and proportioning, automatically achieved by switches on the self-indicating dial, these controlling various material feeders. Typical proportioning is in Rubber, Provender Mills and Cement Batching Plants. These machines are made up to many tons in capacity and either fixed or portable.





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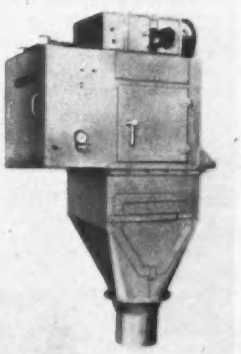

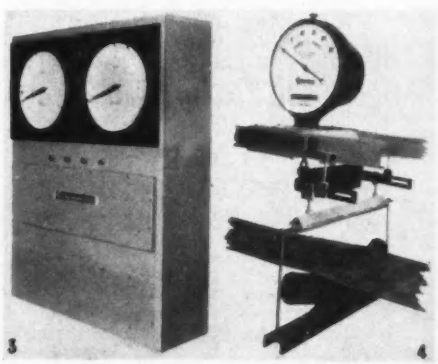

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BRITISH CHEMICAL PRICES

These prices are checked with the manufacturers, but in many cases there are variations according to quality, quantity, place of delivery, etc. Abbreviations: d/d, delivered; c.p., carriage paid; ret., returnable; non-ret. pack., non-returnable packaging; tech., technical; comm., commercial; gran., granular.

All prices per ton unless otherwise stated

GENERAL CHEMICALS

Acetic Acid. D/d in ret. barrels (tech. acid barrels free); in glass carboys, £8; demijohns, £12 extra. 80% tech., 10 tons, £97; 80% pure, 10 tons, £103; commercial glacial, 10 tons, £106.

Acetic Anhydride. Ton lots d/d, £128.

Alum. Ground, f.o.r., about £25.
MANCHESTER: Ground, £25.

Aluminium Sulphate. Ex-works, d/d, £15 10s to £18.
MANCHESTER: £16 to £18.

Ammonia, Anhydrous. Per lb., 1s 9d-2s 3d.

Ammonium Chloride. Per ton lot, in non-ret. pack, £33 2s 6d.

Ammonium Nitrate. D/d, 4-ton lots, £31.

Ammonium Persulphate. Per cwt., in 1-cwt. lots, d/d, £6 13s 6d; per ton, in min. 1-ton lots, d/d, £123 10s.

Ammonium Phosphate. Mono-and di-, ton lots, d/d, £106 and £97 10s.

Antimony Sulphide. Per lb., d/d UK in min. 1-ton lots: crimson, 5s d/d to 5s 5½d; golden, 3s 3½d d/d per lb. to 4s 8½d d/d.

Arsenic. Ex-store, £45 to £50.

Barium Carbonate. Precip., d/d, 5-ton lots or more, bag packing, £41

Barium Chloride. 2-ton lots, £46.

Barium Sulphate [Dry Blanc Fixe]. Precip. 2-ton lots, d/d, £39.

Bleaching Powder. Ret. casks, c.p. station, in 4-ton lots. £30 7s 6d.

Borax. Ton lots, in hessian sacks, c.p. Tech. anhydrous, £70; gran., £47; crystal, £50 10s; powder, £51 10s; extra fine powder, £52 10s; BP, gran., £56; crystal, £59 10s; powder, £60 10s; extra fine powder, £61 10s. Most grades in 6-ply paper bags, £1 less.

Boric Acid. Ton lots, in hessian sacks, c.p. Comm., gran., £78; crystal, £87; powder, £84; extra fine powder, £86 10s; BP gran., £91; crystal, £99; powder, £96 10s; extra fine powder, £98 10s. Most grades in 6-ply paper bags, £1 less.

Calcium Chloride. Ton lots, in non-ret. pack; solid and flake, about £15.

Chlorine, Liquid. In ret. 16-17 cwt. drums d/d in 3-drum lots, £41.

Chromic Acid. Less 2½%, d/d UK, in 1-ton lots, per lb., 2s 2¾d.

Chromium Sulphate, Basic. Crystals, d/d, per lb., 8¼d; per ton, £79 6s 8d.

Citric Acid. In kegs, 1-cwt. lots, per cwt., £11 5s, 5 cwt. lots, per cwt., £11; packed in jute bags or five ply paper bags, both with polythene liners, 5 cwt. lots up, per cwt., £10 12s; 1-4 cwt. lots per cwt., £10 17s.

Cobalt Oxide. Black, per lb., d/d, bulk quantities, 13s 2d.

Copper Carbonate. Per lb., 2s 1d.

Copper Sulphate. F.o.b., less 2% in 2-cwt. bags, £74 10s.

Cream of Tartar. 100%, per cwt., about £11 12s.

Formaldehyde. In casks, d/d, £40

Formic Acid. 85%, in 4-ton lots, c.p., £91.

Glycerine. Chem. pure, double distilled 1.2627 s.g., per cwt., in 5-cwt. drums for annual purchases of over 5-ton lots and under 25 tons, £12 1s 6d. Refined technical grade industrial, 5s per cwt. less than chem. pure.

Hydrochloric Acid. Spot, per carboy, d/d (according to purity, strength and locality), about 12s.

Hydrofluoric Acid. 60%, per lb., about 1s 2d.

Hydrogen Peroxide. Carboys extra and ret. 27.5% wt., £119 0s 0d; 35% wt., d/d, £143.

Iodine. Resublimed BP, under 1 cwt., per lb., 11s; for 1-cwt. lots, per lb., 10s 6d.

Iodoform. Under 1 cwt., per lb., £1 2s 4d, for 1-cwt. lots, per lb., £1 1s 8d, 5 cwt., per lb., 21s 1d, crystals, 3s more.

Lactic Acid. Pale tech., 44% by wt., per lb., 14d; dark tech., 44% by wt., per lb., 9d; chem. quality, 44% by wt., per lb., 12½d; 1-ton lots, ex-works, usual container terms.

Lead Acetate. White, about £154.

Lead Nitrate. 1-ton lots, about £135.

Lead, Red. Basis prices: Genuine dry red, £104 15s; orange lead, £116 15s. Ground in oil: red, £125 5s, orange, £137 5s.

Lead, White. Basis prices: Dry English in 5-cwt. casks, £116 15s; Ground in oil: English, 1-cwt. lots, per ton, £135 15s.

Lime Acetate. Brown, ton lots, d/d, £40; grey, 80-82%, ton lots, d/d, £45.

Litharge. In 5-ton lots, £106 15s.

Magnesite. Calcined, in bags, ex-works, about £21.

Magnesium Carbonate. Light, comm., d/d, 2-ton lots, £84 10s under 2 tons, £97.

Magnesium Chloride. Solid (ex-wharf), £17 10s.

Magnesium Oxide. Light, comm., d/d, under 1-ton lots, £245.

Magnesium Sulphate. Crystals, £16.

Mercuric Chloride. Tech. powder, per lb., for 5-cwt. lots, in 28-lb. parcels, £1 1s 3d; smaller quantities dearer.

Mercury Sulphide, Red. 5-cwt. lots in 28-lb. parcels, per lb., £1 10s. 6d.

Nickel Sulphate. D/d, buyers UK, nominal, £170.

Nitric Acid. 80° Tw., £35 2s.

Oxalic Acid. Home manufacture, min. 4-ton lots, in 5-cwt. casks, c.p., about £133.

Phosphoric Acid. Tech. (s.g. 1.700) ton lots, c.p., £100; BP (s.g. 1.750), ton lots, c.p., per lb., 1s 4d.

Potash, Caustic. Solid, 1-ton lots, £95 10s; liquid, £36 15s.

Potassium Carbonate. Calcined, 96/98%, 1-ton lots, ex-store, about £76.

Potassium Chloride. Industrial, 96%, 1-ton lots, about £24.

Potassium Dichromate. Gran., per lb., in 5-cwt. to 1-ton lots, d/d UK, 1s 2¼d.

Potassium Iodide. BP, under 1-cwt., per lb., 6s 10d; per lb. for 1-cwt. lots, 7s 3d.

Potassium Nitrate. 4-ton lots, in non-ret. pack, c.p., £63 10s.

Potassium Permanganate. BP, 1-cwt. lots, per lb., 1s 11¾d; 3-cwt. lots, per lb., 1s 11¼d; 5-cwt. lots, per lb., 1s 10¾d; 1-ton lots, per lb., 1s 10½d; 5-ton lots, per lb., 1s 10d. Tech., 1-ton lots in 1-cwt. drums, per cwt., £9 18s; 5-cwt. in 1-cwt. drums, per cwt., £10; 1-cwt. lots, £10 9s.

Salammoniac. Ton lot, in non-ret. pack, £47 10s.

Salicylic Acid. MANCHESTER: Tech., d/d, per lb., 2s 6d, cwt. lots.

Soda Ash. 58% ex-depot or d/d, London station, 1-ton lots, about £16 11s 6d.

Soda, Caustic. Solid 76/77%: spot, d/d 1-ton lots, £33 16s 6d.

Sodium Acetate. Comm. crystals, d/d, £75 8s.

Sodium Bicarbonate. Ton lot, in non-ret. pack, £21 10s.

Sodium Bisulphite. Powder, 60/62%, d/d 2-ton lots for home trade, £46 2s 6d.

Sodium Carbonate Monohydrate. Ton lot, in non-ret. pack, c.p., £64.

Sodium Chlorate. 1-cwt. drums, c.p. station, in 4-ton lots, about £88 10s.

Sodium Cyanide. 96/98%, ton lot in 1-cwt. drums, £126.

Sodium Dichromate. Gran. Crystals per lb., 1s. Net d/d UK, anhydrous, per lb., 1s 1¾d. Net. del. d/d UK, 5-cwt. to 1-ton lots.

Sodium Fluoride. D/d, 1-ton lots and over, per cwt., £5; 1-cwt. lots, per cwt., £5 10s.

Sodium Hyposulphite. Pea crystals, £38; comm., 1-ton lots, c.p., £34 15s.

Sodium Iodide. BP, under 1 cwt., per lb., 10s; 1-cwt. lots, per lb., 9s 9d.

Sodium Metaphosphate [Calgon]. Flaked, paper sacks, £133.

Sodium Metasilicate. (Spot prices) D/d UK in 1-ton lots, 1-cwt. free paper bags, £29.

Sodium Nitrate. Chilean refined gran. over 98%, 6-ton lots, d/d c.p., per ton £29.

Sodium Nitrite. 4-ton lots, £32.

Sodium Perborate. (10% available oxygen) in 1-cwt. free kegs, 1 ton lots, £129 10s; in 1 cwt. lots, £139 5s.

Sodium Percarbonate. 12½% available oxygen, in 1-cwt. kegs, £170 15s.

Sodium Phosphate. D/d, ton lots: di-sodium, crystalline, £40 10s, anhydrous, £88; tri-sodium, crystalline, £39 10s, anhydrous, £86.

Sodium Silicate. (Spot prices) 75-84° Tw. Lancs and Ches., 6-ton lots, d/d station in loaned drums, £12 10s; Dorset, Somerset and Devon, per ton extra, £3 5s; Scotland and S. Wales, extra, £2 17s 6d. Elsewhere in England, not Cornwall, extra, £1.

Sodium Sulphate [Desiccated Glauber's Salt]. D/d in bags, about £19.

Sodium Sulphate [Glauber's Salt]. D/d, up to £14.

Sodium Sulphate [Salt Cake]. Unground, d/d station in bulk, £10.
MANCHESTER: d/d station, £10 10s.

Sodium Sulphide. Solid, 60/62%, spot, d/d, in drums in 1-ton lots, £36 2s 6d; broken, d/d, in drums in 1-ton lots, £37 2s 6d.

Sodium Sulphite. Anhydrous, £71 10s; comm., d/d station in bags, £27-£28 10s.

Sulphur. 4 tons or more, ground, according to fineness, £20-£22.

Sulphuric Acid. Net, naked at works, 168° Tw. according to quality, £10-£11 12s 6d; 140° Tw., arsenic free, £8 7s 6d; 140° Tw., arsenious, £8 2s 6d.

Tartaric Acid. Per cwt.: 10 cwt. or more, in kegs, 300s; in bags, 292s per cwt.

Titanium Oxide. Standard grade comm., rutile structure, £178; standard grade comm., anatase structure, £163.

Zinc Oxide. Max. for 2-ton lots, d/d, white seal, £106; green seal, £104; red seal, £101.

SOLVENTS AND PLASTICISERS

Acetone. All d/d. In 5-gal. drums, £128; in 10-gal. drums, £118; in 40-45 gal. drums, under 1 ton, £93; 1-5 tons, £90; 5-10 tons, £89; 10 tons and up, £88; in 400-gal. tank wagons, £85.

Butyl Acetate BSS. 10-ton lots, £173.

***n*-Butyl Alcohol BSS.** 10 tons, in drums, d/d, £149.

***sec*-Butyl Alcohol.** All d/d. In 5-gal. drums, £168; in 10-gal. drums, £158; in 40-45

gal. drums, under 1 ton, £133; 1-5 tons, £130; 5-10 tons, £129; 10 tons and up, £128; in 400-gal. tank wagons, £125.

tert-**Butyl Alcohol.** 5-gal. drums, £195 10s; 40/45-gal. drums: 1 ton, £175 10s; 1-5 tons, £174 10s; 5-10 tons, £173 10s; 10 tons and up, £172 10s.

Diacetone Alcohol. Small lots: 5-gal. drums, £185; 10-gal. drums, £175. 40/45-gal. drums: under 1 ton, £148; 1-5 tons, £147; 5-10 tons, £146; 10 tons and over, £145, in 400 gal. tank wagons, £142.

Dibutyl Phthalate. In drums, 10 tons, d/d, per ton, £210; 45-gal. drums, d/d, 1-4 drums, £216.

Diethyl Phthalate. In drums, 10 tons, per ton, £187 10s; 45-gal. drums, d/d, 1-4 drums, £193 10s.

Dimethyl Phthalate. In drums, 10 tons, per ton, d/d, £179, 45-gal. drums, d/d, 1-4 drums £185.

Dioctyl Phthalate. In drums, 10 tons, d/d, per ton £284; 45-gal. drums, d/d, 1-4 drums £290.

Ether BSS. 1-ton lots, drums extra, per lb., 1s 11d.

Ethyl Acetate. 10-ton lots, d/d, £145.

Ethyl Alcohol [PB 66 o.p.]. Over 300,000 p. gal. 4s 0½d; d/d in tankers, 2,500-10,000 p. gal. per p. gal., 4s 2½d. D/d in 40/45-gal. drums, p.p.g. extra, 1d. Absolute alcohol (75.2 o.p.), p.p.g. extra, 5d.

Methanol. Pure synthetic, d/d, £43 15s.

Methylated Spirit. Industrial 66° o.p.: 500-gal. and up, d/d in tankers, per gal., 5s 10½d; 100-499 gal. in drums, d/d, per gal., 6s 3d-6s 5d. Pyridinised 66° o.p.: 500 gal. and up, in tankers, d/d, per gal., 6s 2d; 100-499 gal. in drums, d/d, pet gal., 6s 6½d-6s 8½d.

Methyl Ethyl Ketone. All d/d. In 5-gal. drums, £183; in 10-gal. drums, £173; in 40/45-gal. drums, under 1 ton, £148; 1-5 tons, £145; 5-10 tons, £144; 10 tons and up, £143; in 400-gal. tank wagons, £140.

Methyl *iso*Butyl Carbinol. All d/d. In 5-gal. drums, £203; in 10-gal. drums, £193; 40-45 gal. drums, less than 1 ton, £168; 1-9 tons, £165; 10 tons and over, £163; in 400-gal. tank wagons, £160.

Methyl *iso*Butyl Ketone. All d/d. In 5-gal. drums, £209; in 10-gal. drums, £199; in 40/45-gal. drums, under 1 ton, £174; 1-5 tons, £171; 5-10 tons, £170; 10 tons and up, £169; in 400-gal. tank wagons, £166.

***iso*Propyl Acetate.** In drums, 10 tons, d/d, £137; 45-gal. drums, d/d, £143.

***iso*Propyl Alcohol.** Small lots: 5-gal. drums, £118; 10-gal. drums, £108; 40/45-gal. drums: less than 1 ton, £83; 1-9 tons, £81; 10-50 tons, £80 10s; 50 tons and up, £80.

RUBBER CHEMICALS

Carbon Disulphide. According to quality, £61-£67.

Carbon Black. GPF: Ex-store, Swansea. Min. 3-ton lots, one delivery, 7¼d per lb.; min. 1-ton lots and up to 3-tons, one delivery, 7⅞d per lb; ex-store, Manchester, London and Glasgow, 8¼d per lb. HAF: ex-store, Swansea; Min. 3-ton lots, one delivery, 8d per lb.; min. 1-ton lots and up to 3-tons, one delivery, 8¼d per lb.

Carbon Tetrachloride. Ton lots, £83 15s.

India-Rubber Substitutes. White, per lb., 1s 5¾d to 1s 8d; dark, d/d, per lb., 1s 1¼d-1s 5d.

Lithopone. 30%, about £55 10s. for 5 ton lots.

Mineral Black. £7 10s-£10.

Sulphur Chloride. British, about £50.

Vegetable Lamp Black. 2-ton lots, £64 8s.

Vermilion. Pale or deep, 7-lb. lots, per lb., 15s 6d.

COAL TAR PRODUCTS

Benzole. Per gal., min. 200 gal., d/d in bulk, 90's, 5s. 3d; pure, 5s 7d.

Carbolic Acid. Crystals, min. price, d/d bulk, per lb., 1s 4d; 40/50-gal. ret. drums extra, per lb., ¼d. Crude, 60's, per gal., 8s 4d..
MANCHESTER: Crystals, d/d, per lb., 1s 4d-1s 7d; crude, naked, at works, 8s 5d.

Creosote. Home trade, per gal., according to quality, f.o.r. maker's works, 1s-1s 9d.
MANCHESTER: Per gal., 1s 2d-1s 8d.

Cresylic Acid. Pale 99/100%, per gal., 6s 8d. D/d UK in bulk: Pale ADF, per imperial gallon f.o.b. UK, 7s 3d per US gallon, c.i.f. NY, 95 cents freight equalised.

Naphtha. Solvent, 90/160°, per gal., 5s. 1d; heavy, 90/190°, for bulk 1,000-gal. lots, d/d, per gal., 3s 11d. Drums extra; higher prices for smaller lots.

Naphthalene. Crude, 4-ton lots, in buyers' bags, nominal, according to m.p.: £19-£30; hot pressed, bulk, ex-works, £40; refined crystals, d/d min. 4-ton lots, £65-£66.

Pitch. Medium, soft, home trade, f.o.r. suppliers' works, £10 10s; export trade, f.o.b. suppliers' port, about £12.

Pyridine. 90/160, per gal., 15s-17s 6d.

Toluol. Pure, per gal., 5s 2d; 90's, d/d, 2,000 gal. in bulk, per gal., 4s 11d.
MANCHESTER: Pure, naked, per gal., 5s 6d.

Xylole. According to grade, in 1,000-gal. lots, d/d London area in bulk, per gal., 5s 9d-6s.

INTERMEDIATES AND DYES

(Prices Nominal)

m-**Cresol** 98/100%. 10 cwt. lots d/d, per lb., 4s 9d.

o-**Cresol** 30/31°C. D/d, per lb., 1s.

p-**Cresol** 34/35°C. 10 cwt. lots d/d, per lb. 5s.

Dichloraniline. Per lb., 4s 6d.

Dinitrobenzene. 88/99°C., per lb., 2s 1d.

Dinitrotoluene. Drums extra. SP 15°C., per lb., 2s 1½d; SP 26°C., per lb., 1s 5d; SP 33°C., per lb., 1s 2½d; SP 66/68°C., per lb., 2s 1d.

p-**Nitraniline.** Per lb., 5s 1d.

Nitrobenzene. Spot, 90 gal. drums (drums extra), 1-ton lots d/d, per lb. 10d.

Nitronaphthalene. Per lb., 2s 5½d.

o-**Toluidine.** 8-10 cwt. drums (drums extra), per lb., 1s 11d.

p-**Toluidine.** In casks, per lb., 6s 1d.

Dimethylaniline. Drums extra, c.p., per lb., 3s 4d.

TRADE NOTES

Glass Fibre Products

Turner Brothers Asbestos Co. Ltd., P.O. Box 40, Rochdale, Lancs, have introduced a comprehensive brochure dealing with their Duraglas glass fibre products and a booklet detailing their complete range of p.t.f.e. products.

Auto-Klean in Industry

Auto-Klean Strainers Ltd., Hounslow, Middlesex, have published a brochure 'Auto-Klean in Industry' which describes their comprehensive range of filters and illustrates some of their more unusual applications in industrial engineering. Its aim is to assist manufacturers, designers and engineers to find the economic solution to their individual filtration requirements.

Bullows-Graco Agreement

Alfred Bullows and Sons Ltd., Long Street, Walsall have signed an agreement with the Gray Company Inc., Minneapolis, U.S., whereby they have sole distribution rights in the U.K. for the complete range of Graco industrial equipment. The Graco range includes, heavy material spray and extrusion equipment, and fluid transfer equipment of all types.

Materials Handling Equipment

Powell Duffryn Engineering Co. Ltd., Cardiff, have been appointed licensed manufacturers for the U.K. and Europe of Dempster-Dumpster container-handling vehicles and equipment. The name Dempster-Dumpster is the registered trade mark of Dempster Brothers, Knoxville, U.S.A., for their equipment used in the handling of waste and process materials. The equipment is mounted on standard commercial road vehicles.

Nashton Scottish Agents

Nash and Thompson Ltd., Chessington, Surrey, have appointed A. R. Bolton and Co., 3a St. Vincent Street, Edinburgh 3 (Caledonian 2065) as their sole agents for Scotland.

The products manufactured by Nash and Thompson fall into several fields, including the Nashton miniaturised electronic test instruments, metallurgical equipment, survey equipment, a silicon and germanium crystal pulling furnace, process control equipment, gas and mining equipment, medical instruments and equipment for the oil industry.

Specialised P.R. Service

W.P.R. Ltd., of 184 Fleet Street, London E.C.4 (tel. FLE 4588), are offering a specialised press and public relations service at home and overseas to manufacturers of chemicals and chemical plant. Principal is Dr. W. F. Coxon, M.Sc., F.R.I.C., who is also a member of the Institute of Journalists.

Nitrous Oxide as Aerosol Propellant

WELL known as an anaesthetic, nitrous oxide is likely to develop a second important application in this country as an aerosol propellant. Use of the gas for this purpose is being investigated by a large manufacturer of shaving cream and at least one company is making plans to introduce aerosol food-packs.

Nitrous oxide would be a less expensive propellant for shaving cream—Britain's main aerosol product—than those now employed.

A market for food aerosol is already established in the U.S. where sauces and mayonnaise are among the nitrous oxide propelled foods on sale. In the U.K. British Oxygen Gases Ltd., are co-operating with manufacturers in the development of similarly propelled products.

NEW PATENTS

By permission of the Controller, HM Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents)', which is available from the Patent Office (Sales Branch), 25 Southampton Buildings, Chancery Lane, London W.C.2, price 3s 6d including postage; annual subscription £8 2s.

Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

ACCEPTANCES

Open to public inspection 4 November

Modifying the properties of fibrous textile materials. Imperial Chemical Industries Ltd., Henshall, A. E., Nicholson, E. S., and Sagar, H. **822 855**

Antibiotic actinobolin and salts thereof. Parke, Davis & Co. **823 115**

Cracking hydrocarbons. Badische Anilin- & Soda-Fabrik AG. **822 991**

Separating phenol from aqueous liquors by solvent extraction. Phenolchemie GmbH. **822 992**

Preparation of polyolefins. Sun Oil Co. **822 993**

Metal-containing water-insoluble disazo dyestuffs. Farbenfabriken Bayer AG. **822 858**

Treatment of gases obtained by hydrocarbon pyrolysis. Soc. Belge de L'Azote et des Produits Chimiques du Marly. **822 863**

Organosiloxane resins. Midland Silicones Ltd. **823 039 & 823 040**

Siloxane moulding compositions. Union Carbide Corp. **822 859**

Process for catalytic hydrodesulphurisation of petroleum hydrocarbons and catalysts therefor. Gulf Research & Development Co. **823 119**

Method of producing alkyl chlorides and polymeric zirconium compounds containing chlorine and alkoxy groups. Goldschmidt AG., T. **823 172**

Catalyst manufacture. Universal Oil Products Co. **822 998**

Catalytic cracking of methyl isopropenyl ketone dimer to methyl isopropenyl ketone. Dow Chemical Co. **822 999**

Formation of crystalline films. Du Pont de Nemours & Co., E. I. **823 174**

Resin-drug compounds. Clinical Products Ltd. **823 000**

Acaricidal compositions. Farbenfabriken Bayer AG. **823 001**

Improving adhesion of polyethylene coatings to metals. Metallgesellschaft AG. **823 175**

Production of nitrogenous derivatives of propargyl alcohol. Badische Anilin- & Soda-Fabrik AG. **823 002**

Magnesium-zinc paint pigments. Dow Chemical Co **823 003**

Production of polymers of unsaturated polymerisable ethylene derivatives. Badische Anilin- & Soda-Fabrik AG. **823 176**

Process for regenerating catalysts used in the synthesis of acrylonitrile. Farbenfabriken Bayer AG. **822 866**

Production of ammonia. Du Pont de Nemours & Co., E. I. **822 867**

Viscosity stabilised oxidised synthetic polymeric drying oil solutions. Esso Research & Engineering Co. **823 177**

Removing dissolved water from porous 96% silica glass. Corning Glass Works. **822 868**

Pesticides. Geigy AG., J. R. **822 869**

Production of epoxidic compounds. Chemische Werke Hüls AG. **823 180**

Epoxy-substituted aromatic compounds and process for preparing these compounds. Bataafsche Petroleum Maatschappij NV., DE. **823 181**

Extraction process for refining lubricating oils. Esso Research & Engineering Co. **823 182**

Epoxide resins. Bergwerksverband zur Verwertung von Schutzrechten der Kohlentechnik GmbH. **823 183**

Production of 1.4- and 1.5-cyclo-octanolone by oxidation and cyclo-octane. Badische Anilin- & Soda-Fabrik AG. **823 007**

Phosphoric and thio phosphoric acid esters. Boehringer, A., Boehringer E., Liebrecht, J., Liebrecht, J., and Mayer-List, W., [trading as Boehringer Sohn, C. H.]. **823 186**

Process for isomerisation of hydrocarbons. Universal Oil Products Co. **823 010**

Heterocyclic bis-sulphonamides. Farbenfabriken Bayer AG. **822 871**

N-substituted-piperidinecarboxylic acid amides and process for their preparation. Bristol Laboratories Inc. **823 197**

Phenthiazine derivatives and processes for their preparation. Soc. des Usines Chimiques Rhone-Poulenc. **823 191**

Fungicidal compositions. Farbenfabriken Bayer AG. **822 872**

Processes for preparation of deuterium-containing carbon. Bataafsche Petroleum Maatschappij NV., De. **823 198**

Calcium trimethylolphenate. Union Carbide Corp. **822 887**

Process for producing aqueous trimethylolphenol solutions. Union Carbide Corp. **822 886**

Production of artificial filaments of regenerated cellulose from viscose. Glanzstoff-Courtaulds GmbH., and Stockhausen, J. **823 200**

Hydrocarbon fuels. Shell Research Ltd. **822 877**

Temperature-staged catalyst pretreatment and polymerisation process employing same. Esso Research & Engineering Co. **823 021**

Catalytic polymerisation of α-olefins and the preparation of catalysts therefor. Bataafsche Petroleum Maatschappij NV., DE. **823 024**

Olefin polymerisation processes. Petrochemicals Ltd. **823 194**

Cough remedies containing polyglycol ether derivatives. Badische Aniline- & Soda-Fabrik AG. **823 025**

Catalyst for reducing nitro-benzene and process of reducing nitro-benzene therewith. Fairweather, H. G. C. (American Cyanamid Co.) **823 026**

Production of tetrahydrofuran. Du Pont de Nemours & Co., E. I. **822 897**

Open to public inspection 11 November

Removal of hydrogen sulphide from gases. Dempster & Sons Ltd., R. **823 366**

Surface treatment of metals. Walterisation Co. Ltd. **823 369**

Formation of coatings on metal surfaces. Pyrene Co. Ltd. **823 373**

Herbicidal compounds. Boots Pure Drug Co. Ltd. [Cognate application 27213.] **823 208**

Carbonisation of coal. Wests' Gas Improvement Co. Ltd., West, F. J., and West, E. **823 530**

Process for protecting a metal structure in contact with a stream of sea water. Soc. de Condensation et D'Applications Mecaniques. **823 531**

Anion exchange resins and their production. Imperial Chemical Industries Ltd. **823 594**

Recovering manganese compounds from manganese-containing materials. Williams, B. **823 215**

Compositions as nutrients for plant growth. Ferro Enamels Ltd. **823 216**

Process for improving the smoothness of yarns comprising staple fibres of polyesters polyamides or polyvinyl compounds. Farbwerke Hoechst AG. **823 220**

Azo dyestuffs derived from dextran. Commonwealth Engineering Co. of Ohio. **823 221**

Production of mixed pitches from phenol pitches. Leuna-Werke W. Ulbricht Veb. **823 381**

Methods and apparatus for extracting dust and like fragments of burnt or partially burnt solid material from combustion gases. Meldrum, Flood-Page Ltd., and Flood-Page, M. W. **823 542**

Processes and apparatus for the production of very pure crystalline substances. Siemens & Halske AG. [Addition to 795 191.] **823 383**

Production of aromatic amines which are alkylated on the nucleus. Farbenfabriken Bayer AG. **823 223**

Preparation of polyesters. Roser GmbH., C. F. **823 224**

Process for optically brightening fibrous materials. Ciba Ltd. [Addition to 746 046.] **823 227**

2-Hydroxy-4-alkoxy-4'-alkylbenzophenones and compositions containing the same. Ward Blenkinsop & Co. Ltd. **823 544**

Method of producing tetracycline. American Cyanamid Co. [Addition to 775 115.] **823 230**

Production of sorbic acid. Celanese Corp. of America **823 233**

Metal complexes of benzene-monoazo-pyrazolone dyestuffs. Badische Anilin- & Soda-Fabrik AG. **823 393**

Salts of di-(4-amidino-phenyl)-triazene-(N-1:3) and a process for their manufacture. Farbwerke Hoechst AG. **823 234**

Preparation of a zinc dialkyl dithiophosphate product. American Cyanamid Co. **823 235**

Polymerising olefins with catalysts containing alkyl lead compounds. Montecatini Soc. **823 236**

Quaternary ammonium xanthates. Goodrich Co., B. F. **823 395**

Process for refining hydrocarbon oils and obtaining purified surface-active products from refined oil and from acid sludges. Brunel, H. **823 237**

Heating of glass. Pittsburgh Plate Glass Co. **823 551**

Evaporators. Richardsons, Westgarth & Co. Ltd., and Frankel, A. **823 239**

Therapeutic compositions containing choline salts of dialkyl xanthines. Warner-Lambert Pharmaceutical Co. [Addition to 736 443.] **823 242**

Recovery of polymer crumb from waste dope. American Cyanamid Co. **823 243**

Alcohol-modified amino-aldehyde resins. Celanese Corp. of America. **823 246**

Fabrics comprising yarns of a copolymer of acrylonitrile and vinylidine chloride. British Celanese Ltd. **823 247**

Anti-corrosion oils. Esso Research & Engineering Co. **823 249**

Electrolytic cells. Imperial Chemical Industries Ltd. **823 598 & 823 599**

Preparations containing benzoxathiol derivatives for the care of hair and skin. Thomae GmbH., K. **823 251**

Fly repellent. Ratner, L. **823 235**

Improving wet fastness properties of direct dyeings. Ciba Ltd. **823 405**

Production of metal powders. Hartmetallwerk Immelborn Veb. **823 407**

Production of coloured structures of vinyl polymers. Ciba Ltd. **823 257**

Curing salt compositions. Griffith Laboratories Inc. **823 411**

Process for splitting steroid racemates. Ciba Ltd. **823 258**

4-aryl 1-1-(substituted)-piperidine-4-carboxylates and acid addition salts thereof. Sterling Drug Inc. **823 413**

Esters and process for their manufacture. Ciba Ltd. **823 259**

Polyvinyl acetals. Celanese Corp. of America. **823 260**

Process for producing fluoro-halocarbons. Minnesota Mining & Manufacturing Co. **823 262**

Preparations containing phosphorus and halogen-containing condensation products. Ciba Ltd. **823 415**

Oxazolidone compounds and methods for producing same. Parke, Davis & Co. **823 265**

Production of boron nitride. Union Carbide Corp. **823 266**

Titanium-vanadium-aluminium alloys. Mallory-Sharon Metals Corp. **823 420**

Thermal polymerisation of olefinic nitriles. Monsanto Chemical Co. **823 273**

Production of alkali-metal polyphosphates. Knapsack-Griesheim AG. **823 274**

Hydrocarbon conversion process. Esso Research & Engineering Co. **823 426**

Treatment of ferrous metal. British Oxygen Co. Ltd. **823 428**

Heterocyclic magnesium chloride complexes. Metal & Thermit Corp. [Addition to 779 100.] **823 276**

Heat-treated compositions of butyl rubber and alkenylhalosilane-modified mineral fillers. Esso Research & Engineering Co. **823 279**

Method and apparatus for separation of isotopic ions. Beyrard-Benchemoul, N. R., and Oss Van, C. J. **823 283**

Process and apparatus for effluent refrigeration of an alkylation operation. Texaco Development Corp. **823 284**

Production of vinyl chloride. Soc. Belge de L'Azote et des Produits Chemiques du Marly. **823 285**

Germicidal agents. Newby, H. (Chemische Werke Hüls AG.) **823 286**

Polymerisation process for producing heavy propylene polymers. California Research Corp. **823 287**

Production of vitamin B_{12}. Dehn, F. B. (Richter Gedeon Vegyeszeti Gyar R.T.). **823 291**

Coprecipitation of metal oxides. Magneto-Chemie NV. **823 436**

Oxidation of dialkyl benzenes. Imperial Chemical Industries Ltd. **823 437**

Steroids and the manufacture thereof. Upjohn Co. **823 293**

Injectable corticotrophin preparations. Crookes Laboratories Ltd. **823 445**

Dehydrogenation of olefins. Polymer Corp. Ltd. **823 296**

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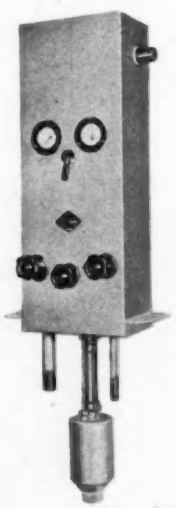

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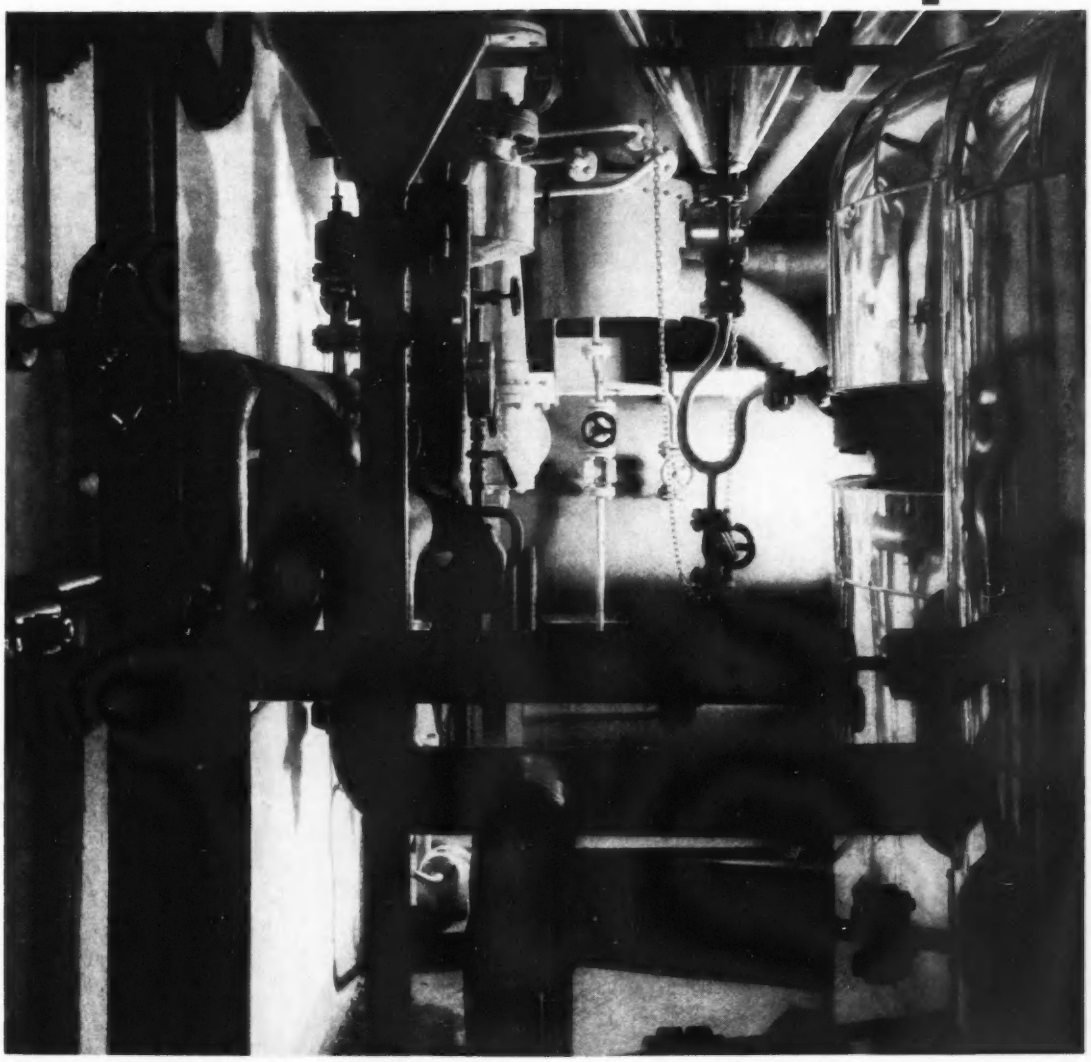

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